FROM HOMETOWN TO GROWTOWN:

A STUDY OF PERMACULTURE-BASED NEIGHBORHOOD REVITALIZATION STRATEGIES FOR MUNCIE, INDIANA

A CREATIVE PROJECT

SUBMITTED TO THE GRADUATE SCHOOL

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS

FOR THE DEGREE

MASTER OF LANDSCAPE ARCHITECTURE

BY

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This creative project represents the culmination of many years of education in search of my true passion in life. I am happy to say that through this project and the past three years, I have finally found it.

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Chapter 1

Introduction

Muncie, Indiana has experienced a dramatic loss in population since its peak as an important manufacturing center in the Midwest. This loss in population has led to an excess of abandoned and blighted property and an infrastructure that is in great need of reinvestment. It is important that Muncie address the need to stabilize those neighborhoods that are now distressed and align the city's built environment with the existing needs of residents, as well as the needs of future populations (Schilling 453). The current concerns facing this and other "shrinking cities" provide the opportunity to innovatively address existing problems that resulted from a significant loss in population (Gallagher 11).

In addition to excess abandoned land, Muncie is facing another equally important problem. Second Harvest Food Bank of East Central Indiana and Feeding America recently released data from the "Map the Meal Gap" study showing that 26.8% of residents in Delaware County, Indiana under the age of eighteen don't know when they

will have their next meal (Farguheson). The communities people live in should provide for their basic needs including, shelter, safety, health and well-being. With such startling numbers of people suffering from a lack of access to food, and especially food that is safe and nutritious, this study hypothesizes that existing neighborhoods can (and should) be retrofitted to provide better access to foods that will sustain and improve them.

Many of the problems with access to healthy, safe food that Muncie is currently facing are representative of problems that plague the entire nation. More than fifty million people in the United States live in households that are food insecure. This means that their ability to provide sufficient food for all members of their family is often inconsistent. The number of households experiencing this type of hardship has increased dramatically since the recent economic downturn (Miller 1-3).

According to the US Center for Disease Control, thirty-one percent of adults in Delaware County, Indiana are considered obese. In addition, more than ten percent of adults have also been diagnosed as diabetic ("Obesity and Overweight…").

The significance of this study lies in its ability to address issues surrounding the obesity epidemic, lack of access to food, shrinking cities with a surplus of vacant land, neighborhood revitalization, and urban agriculture and how addressing each of these can contribute to the development of a model to turn struggling neighborhoods into places that promote healthy eating, encourage involvement in food production, while also improving the existing infrastructure. While the focus of this study is the redesign of existing communities around the production of food and fostering a better understanding

of where food comes from, one cannot ignore these other issues and the fact that they are so often intertwined.

ASSUMPTIONS AND DELIMITATIONS

The issues surrounding the implementation of urban agriculture on previously developed land are very complex. In order for this study to focus on the benefits of implementing such practices, certain assumptions will be made and are listed below.

1. Soil remediation will be essential on sites where soil testing deems necessary. These methods will be mentioned, but the scientific processes involved will not be discussed in great depth or detail.
2. All food production will employ organic growing methods as defined by the USDA as follows:

   > "Organic agriculture is an ecological production management system that promotes and enhances biodiversity, biological cycles and soil biological activity. It is based on minimal use of off-farm inputs and on management practices that restore, maintain and enhance ecological harmony" (Gold).

3. The local government, city officials, and residents of this area are supportive of the proposed changes.
4. All land ownership issues have been addressed and resolved.
5. This study is hypothetical in nature and none of the proposed elements will be implemented.

PROJECT SCOPE

The scope of this project could become exceedingly large given the complex issues surrounding food production and distribution in this country. For this reason, certain limitations have been set in order to focus in on the study's goals and objectives.

- The aim of this study is not to supply the local community with the entirety of their food needs, but rather to produce as much as possible on the available land. The productive potential of certain areas will be discussed, but only to give readers an idea of the unrealized potential value of an area. Larger tracts of land that could be used for the sole purpose of agricultural production are available in close proximity to the site but do not align with the goals of this particular study.
- The agricultural practices discussed in this study will be smaller in scale. They will focus on how neighborhoods can be retrofitted to support food production and distribution around and near their homes.

METHODOLOGY

The methodologies utilized in this study are grounded in a critical look at literature relevant to the many topics that contribute to this study in various ways. The recent history of Muncie, Indiana and how the past has contributed to many of the current problems related to access to food in underserved communities is a key area of focus. Case studies also serve as critical models for the successful integration of agricultural into the landscape and everyday life. Important lessons can be learned from

the successes of these designs as well as their shortcomings. Design is used as a method for exploring potential solutions to problems within the site and the community.

The final stage of the project synthesizes research, analysis, and the creative process to generate a cohesive design proposal for the community based upon a clearly defined set of goals and objectives. The design is a substantial portion of the study and includes the creation of a program tailored to the site, site inventory and analysis, and a series of design interventions at a variety of scales that are intended for varied land uses.

Chapter 2

Critical Topics

A National Food Crisis

Approximately twenty-seven percent of residents in Delaware County, Indiana under the age of eighteen don't know when they will have their next meal (Farguheson). Household food insecurity in this part of the world most often means that families often run out of money and are unable to buy food, or frequently run out of food before they have enough money to purchase more (Miller 2). The inability to provide for one's family is most often due to a sudden decrease in income or job loss, illness, old age, as well as many other reasons. Food insecurity is also typically most prevalent in households that are headed by a single mother (Miller 2).

Much of the food insecurity that exists in the United States differs from the food insecurity in much of the rest of the world. In many other countries, lack of access to food of any kind is the problem. Here, a lack of access to food isn't the biggest problem, but rather a lack of access to the *right* foods. The most affordable, accessible, and overeaten

foods are full of calories, but lacking in nutrients. The abundance (or excess) of cheap calories from processed food as opposed to wholesome, fresh, nutrient rich calories at an affordable price have lead to an increasing obesity epidemic (Nordahl 35). Recent studies of families on food stamps show that women and children who are on food stamps are much more likely to be overweight than those who are not (Miller 1-3). It should come as no surprise then, that four of the six leading causes of death in the United States (heart disease, diabetes, stroke, and some cancers) are diet-related chronic diseases (Hodgson 9).

These maps in Figure 1.1 generated by the Center for Disease Control show how the obesity rates in America have increased over the past twenty years. In 2010, no state had a prevalence of obesity less than twenty percent and thirty-six states are identified as having twenty-five percent or more of their population considered obese. Twelve of these states have an obesity rate of thirty percent or greater. In Indiana, the obesity rate is among the highest in the nation at 29.6%. The obesity rate in Delaware County, Indiana is even higher than the state's average at thirty-one percent of adults considered obese. The ramifications of such a high obesity rate are seen in another statistic; 10.4% of adults in Delaware County have been diagnosed with diabetes ("Obesity and Overweight…"). This does not account for the many other adult cases that likely exist but have not been diagnosed or any of the diagnosed cases in children.

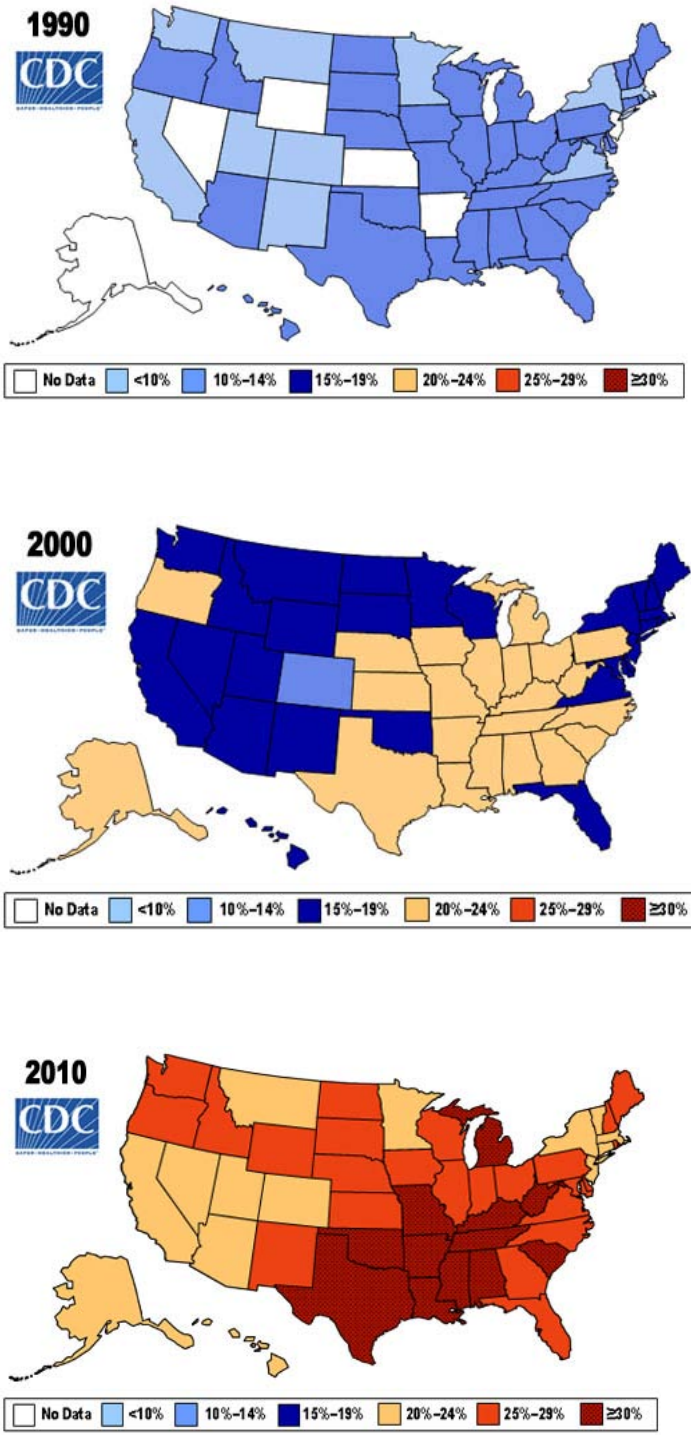


Figure 2. 1 Centers for Disease Control and Prevention national obesity trends for 1990-2010

Source: "Obesity and Overweight for Professionals: Data and Statistics: U.S. Obesity Trends," *Centers for Disease Control and Prevention*, Center for Disease Control, 21 July 2011, Web. 23 Jan. 2012.

The nation's highly centralized food distribution system is often cited as the culprit for lack of access to healthy foods. Grocery store chains show little interest in poor, urban communities because the demographics do not fit the industry's ideal and because big supermarkets are looking for big sites to build on. At the same time, small fast food restaurants are popping up everywhere. Researchers say this is a recipe for a public health disaster (Shigley 28).

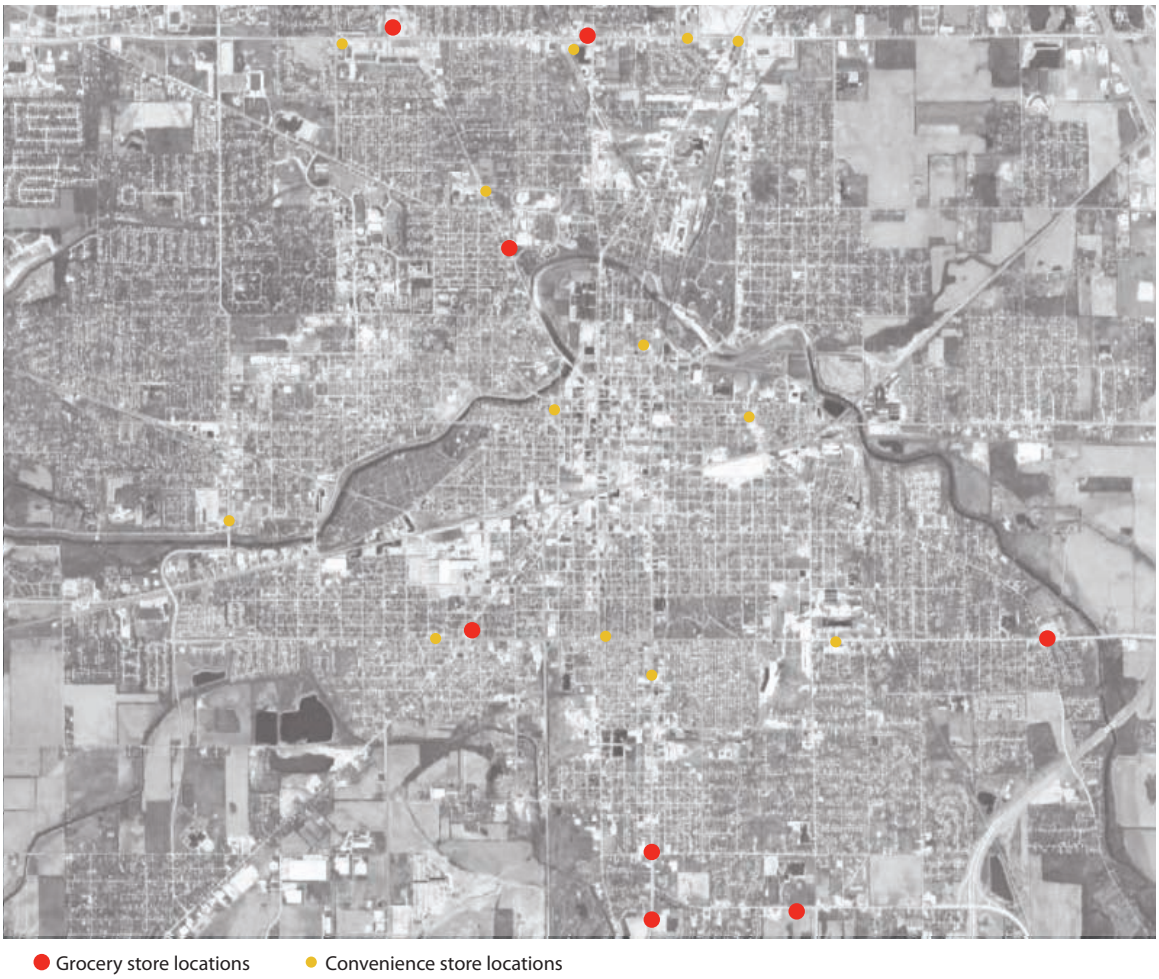


Figure 2. 2 Grocery and convenience store locations in Muncie, Indiana

In 2007, Johns Hopkins University's Bloomberg School of Public Health released a study that showed that Baltimore residents living in predominantly black and low-income neighborhoods have poor access to healthy foods and also paid twenty percent more for basic food necessities, such as milk, in corner stores than in supermarkets (Hodgson 10). Access needs to be created to foods that are produced locally, as opposed to those

funneled through America's highly centralized food distribution system, where prices are increased and much of the fresh produce is sent away from the place where it was grown.

These areas are often referred to as "food deserts," or places with too few choices for healthy, wholesome foods and an overabundance of cheap fast food. The consequential health outlook for people living in food deserts tends to be very predictable. Residents in these areas tend to be poorer and have fewer healthy food options, which contribute to higher obesity rates and diet-related illnesses, including diabetes (Nordahl 36).

Creating Healthy Communities

In order to combat this national food crisis, it is important that existing communities become healthy communities that encourage active lifestyles and offer healthy food choices. There are many factors that contribute to a healthy community including land-use, zoning, schools, transportation policies, crime and safety, grocery store and food outlet locations, and after-school and community programming (Hodgson 10).

Healthy communities also require healthy food systems that provide equitable access to foods that are rich in nutrients at an affordable price to residents. Healthy food systems also need to be sustainable which means supporting small-scale agriculture as well as evaluating and reforming local land-use and zoning policies to support access to better foods (Hodgson11).

In his book, *Public Produce,* Darrin Nordahl references New Urbanist architect Daniel Solomon when he argues that the lack of everyday contact with food in urban settings "erodes our sense of place, disconnects us from the natural environment, and threatens an experience that was once commonplace" (Nordahl 21). Before a significant change in community food systems can occur, food has to be better incorporated into the American vocabulary. Better food choices need to be taught and understood in communities so that people can make healthy choices for themselves and their families (Nordahl 116). By incorporating food into the everyday landscape, people can begin to have a better understanding of where their food comes from and everything that goes into its production.

Gentrification

Gentrification is often defined as the transformation of neighborhoods from low value to a higher value. Such changes have the potential to displace long-time residents and existing businesses because of higher rents, mortgages, and taxes. Gentrification can occur slowly or quite rapidly, on a small scale or on a large scale, and these changes can often alter a neighborhood's characteristics (racial/ethnic composition, average income, etc.) and identity (CDC- Healthy Places).

As this study proposes reinvestment in an underserved community, it is important to realize that displacing long-term residents is a potential outcome. The proposed changes must be implemented in a manner that gives existing residents priority

and involves them in various decision-making processes in order avoid any negative effects.

The Center for Disease Control suggests five strategies for minimizing the adverse effects of gentrification. They are:

1. Create affordable housing for all incomes
2. Approve policies to ensure continued affordability of housing units and the ability of residents to remain in their homes
3. Increase individuals' assets to reduce dependence on subsidized housing
4. Ensure that new housing-related investments benefit current residents
5. Involve the community (CDC-Healthy Places).

While not all of these are relevant to the types of interventions that will be proposed in this study, others are key to determining where investment is best suited in order to best benefit residents. Providing community members with tools to improve their own economic status and ensuring that investments in the community maintain a focus on those who currently inhabit the area will help guide these interventions in a manner that minimizes any negative impacts to the neighborhood.

LEED-ND

LEED-ND is a branch of LEED certification that focuses on neighborhood development. The U.S. Green Building Council (USGBC), the Congress for the New Urbanism (CNU), and the Natural Resource Defense Council (NRDC) worked together

to create a rating system for neighborhood planning and development based on the principles of smart growth, New Urbanism, and green building and infrastructure. The primary emphasis of LEED-ND certification is on "site selection, design and construction elements that bring buildings and infrastructure together into a neighborhood and relate the neighborhood to its landscape as well as its local and regional context" (Congress for New Urbanism et al.). Other LEED rating systems focus mainly on green building practices and offer only a few credits for site selection and design (Congress for New Urbanism et al.).

While it is not a primary goal of this study to obtain LEED certification, the guidelines offer important considerations for the design. Some of the credits that are most relevant to this design are described in the following paragraphs.

LEED-ND Credits

Neighborhood Pattern and Design (NPD) Credit 1: Walkable Streets

Walkable streets are intended "To promote transportation efficiency, including reduced *vehicle miles traveled* (VMT). To promote walking by providing safe, appealing, and comfortable street environments that support public health by reducing pedestrian injuries and encouraging daily physical activity"(Congress for New Urbanism et al.).

NPD Credit 3: Mixed-Use Neighborhood Centers:

The intent of mixed-use neighborhood centers is: "To cluster diverse land uses in accessible neighborhood and regional centers to encourage daily walking, biking, and

transit use, reduce *vehicle miles traveled* (VMT) and automobile dependence, and support car-free living" (Congress for New Urbanism et al.).

NPD Credit 5: Reduce Parking Footprint

The intent of reducing the parking footprint is "To design parking to increase the pedestrian orientation of *projects* and minimize the adverse environmental effects of parking facilities. To reduce public health risks by encouraging daily physical activity associated with walking and bicycling" (Congress for New Urbanism et al.).

NPD Credit 9: Access to Civic and Public Space

Access to these spaces is meant "To improve physical and mental health and social capital by providing a variety of open spaces close to work and home to facilitate social networking, civic engagement, physical activity, and time spent outdoors" (Congress for New Urbanism et al.).

NPD Credit 12: Community Outreach and Involvement

Community outreach and involvement is designed "To encourage responsiveness to community needs by involving the people who live or work in the community in *project* design and planning and in decisions about how it should be improved or how it should change over time" (Congress for New Urbanism et al.).

NPD Credit 13: Local food production

Local food production is a key component to this study and LEED-ND describes the intent of this credit as "To promote community-based food production, improve nutrition through increased access to fresh produce, support preservation of small farms producing a wide variety of crops, reduce the negative environmental effects of large-scale industrial agriculture, and support local economic development that increases the economic value and production of farmlands and community gardens"(Congress for New Urbanism et al.).

NPD Credit 14: Tree-Lined and Shaded Streets

Tree-lined and shaded streets are intended "To encourage walking, bicycling, and transit use and discourage excessive motoring speeds. To reduce urban heat island effects, improve air quality, increase evapotranspiration, and reduce cooling loads in buildings" (Congress for New Urbanism et al.).

Industrial Agriculture

Current industrial agricultural practices in this country are not only troublesome to human health, but also to the health of the environment. Everything from the tilling of soil to the production of livestock and their associated waste, and the enormous amounts of fossil fuels used in the production, processing, packaging, and distribution of foods contribute to greenhouse gas emissions and pollution (Hodgson 10).

America's complete reliance on fossil fuel for food production will spell imminent catastrophe (as it did in Cuba in the 1990s) as the era of cheap, abundant, nonrenewable energy draws to a close. In 1940, one calorie of fossil fuel produced 2.3 calories of food (Nordahl 16). Today, it takes ten calories of fossil fuel to produce a single calorie of food energy. These numbers clearly illustrate the futility of conventional agricultural practices and the need for a new approach, "not as a matter of nostalgia for the agrarian past but as a matter of national security" (Nordahl 16).

The Great American Lawn Syndrome

Lawns have become the de-facto landscape choice for homeowners across America. They have become the number one irrigated crop in the U.S. according to a study published by NASA in 2005. It is estimated that there are more than 49,000 square miles of lawn exist in this country, or three times the size of Greece (Worrel 23). This massive amount of lawn uses an immense amount of water and resources, including over 300 million gallons of gasoline needed to mow each year (Chaffin).

Food Not Lawns, a community organization in Eugene, Oregon claims that local gardens promote a better community life and are essential for a united, healthy, and sustainable community (Worrel 25). Artist, Fritz Haeg, designed a series of case studies of lawns transformed in edible oases in his book titled *Edible Estates.*

In communities located in food desserts where there is limited access to healthy, safe food, the lawn has the potential to become a productive space that can significantly contribute to a household's food needs. However, there is a five-fold difference in the

amount of land required between diets incorporating the least amount of fat and meat and those that have the highest amounts of fat and meat (Peters). All of the food requirements for a single person following a low-fat vegetarian diet can be met using less than one-quarter acre of land. A person consuming a low-fat diet with a high amount of meat intake would require more than two acres to feed only him or herself (Peters). While it may not be possible on most residential lots to provide for the entirety of a household's food intake, it is reasonable to suggest that a significant portion of their diet could be generated from within their own property.

Urban Agriculture

Urban agriculture can be defined very generally as the growing of plants and raising of animals within and around cities (RUAF). The definition of urban agriculture this study uses is described as "the growing, processing and distributing of food and non-food produce such as flowers and trees, through intensive cultivation in and near cities" (Kaufman 177).

The various examples of current urban agricultural endeavors in both big and small cities throughout the U.S. offers a glimpse of a trend that is driven by local policy and individual communities' desire for food production systems that are more economically viable, environmentally sustainable, locally accessible, and healthful (Nordahl 12).

Unlike many Western European cities, many American cities have more vacant land than can realistically be filled with new residential and business developments (Kaufman 177).

> "Addressing this problem has become an important policy concern for municipal governments fiscally burdened by the management of thousands of tax-delinquent parcels, many acquired through foreclosure. Although city officials would prefer to redevelop these parcels with houses and stores that improve neighborhoods and generate tax dollars, the development demand for the abandoned lots is often low" (Kaufman 177).

Many experts now believe that traditional rural agriculture will soon no longer be able to supply the global food demand which could result in an international food crisis Flisram 15). Kaufman and Bailkey discuss the opportunities urban agriculture can provide.

> "City farms can increase the amount of green space, improve the appearance of blighted neighborhoods, and supply low-income residents with fresher and more nutritious food. And, they can help revitalize poor neighborhoods economically by creating modest food-based employment, bringing more income into the pockets of residents and building greater neighborhood self-reliance" (Kaufman 178).

Skeptics of entrepreneurial urban agriculture argue that vacant urban land is too contaminated to grow food safely and that most community organizations lack the knowledge to grow food for sale, support from city officials is lacking, and the market for selling this produce is limited (Kaufman 178). These are valid concerns and each must be addressed in order to successfully create a business from the production of food in urban settings.

Kaufman and Bailkey outline six perceived obstacles that must be addressed in order to successfully establish an entrepreneurial urban agriculture practice. They are as follows:

1. Entrepreneurial urban agriculture projects are difficult to site on vacant city lots due to excessive contamination.
2. Entrepreneurial urban agriculture projects located in crime-ridden neighborhoods are undermined by vandalism.
3. Entrepreneurial urban agriculture projects are not economically viable as profit generators.
4. Entrepreneurial urban agriculture projects are run by people who, although energetic and committed, lack the necessary management and business skills to make sure ventures are successful.
5. Entrepreneurial urban agriculture practitioners do not work together sufficiently to promote the potential and overall value of city farming.

6. Entrepreneurial urban agriculture projects represent a temporary land use, lasting only until "real" revenue-producing development occurs (Kaufman 189-197).

Will Allen, founder of non-profit organization Growing Power, in Milwaukee, Wisconsin, along with other advocates of urban agriculture want to reconnect people in urban areas to the earth. At the same time, they also aim to lessen the effects of food deserts and areas that have been abandoned by large supermarkets along with the rest of their economic base (Flisram 15).

Will Allen's Growing Power uses a different model than the previously mentioned entrepreneurial urban agriculture and instead focuses on creating "community food centers" where residents come to learn sustainable practices for growing, processing, marketing, and distributing food. Fourteen percent of Growing Power's income comes from training and educational workshop fees.

The Edible Schoolyard was founded in 1994 as a non-profit located at Martin Luther King, Jr. Middle School in Berkeley, California. Forty percent of the children who attend this school are considered at or below the poverty line. Growing food, cooking, and eating and the edible schoolyard are integrated into every aspect of the curriculum (Cumberlidge 78).

The Edible Schoolyard makes learning a hands-on active experience and gives children a sense of responsibility for managing the garden while also fostering a sense of

community. The garden itself is a one-acre organic garden that also contains a "kitchen-classroom" (Cumberlidge 78).

> "The Edible Schoolyard addresses several key contemporary social policy agendas in an innovative and creative way. Issues around community cohesion and multiculturalism, public health, education reform and environmental responsibility are all addressed through a visionary yet pragmatic gardening and cooking programme" (Cumberlidge 78).

The Edible Schoolyard's principles are now being applied to all Berkeley public schools in a new School Lunch Initiative, which provides lunches made from healthy, fresh, local produce to all 10,000 students. The program also applies the Edible Schoolyard's model for experiential learning to nurture students' understanding of what they eat (Cumberlidge 81).

Permaculture

Permaculture is a method for designing sustainable human environments. The term permaculture originated as a combination of the words "permanent" and "agriculture" and is reflective of the importance of having sound agricultural practices. Cultures cannot survive for long without a sustainable agricultural base in place and a strong land use ethic (Mollison 1).

Permaculture deals with many elements such as plants, infrastructure, water, buildings, and so on; but permaculture is not about these elements, bur rather the "relationships between them and the way we place them in the landscape" (Mollison 1).

Permaculture aims to design ecologically sound, economically prosperous human communities and is guided by a set of ethics: "caring for Earth, caring for people, and reinvesting the surplus that this care will create" (Hemenway 5). The goal of permaculture is to create systems that are "ecologically sound and economically viable, provide for their own needs, do not exploit or pollute, and are therefore sustainable in the long term" (Mollison 1). Modern agricultural practices rely on energy inputs that come entirely from outside the system, such as petroleum. In permaculture, all of the energy needs of the system are provided by the system. When these needs are not met within the system, the true price is paid in energy consumption and in pollution of valuable land and resources. Conventional farming mines the earth of its valuable fertility, non-renewable resources are used, the land is eroded over time because of extensive plowing and overpopulation of livestock, and land and water are polluted because of chemicals (Mollison 2).

The methods and ideas that make up permaculture are not unique, but what is different is the emphasis on design to produce a functional and productive landscape, rather than merely an aesthetic one (Webb 15).

One way to approach design in permaculture is by using small-scale intensive systems and to grow the design by "chunking," or repeating this small-scale system in an effective arrangement with some variation. These small-scale systems are typically

referred to as guilds. A guild is defined as a group of plants and animals harmoniously interwoven into a pattern of mutual support, often centered around one major species that benefits humans while creating animal habitat. A guild is a human-made assemblage that mimics a natural community, which differs form a plant community, which is made up of plants that naturally occur together. Guilds require plants that fulfill a variety of functions including providing habitat for beneficial birds and insects, nitrogen accumulators, and suppressing grass and weed growth (Hemenway 183-91).

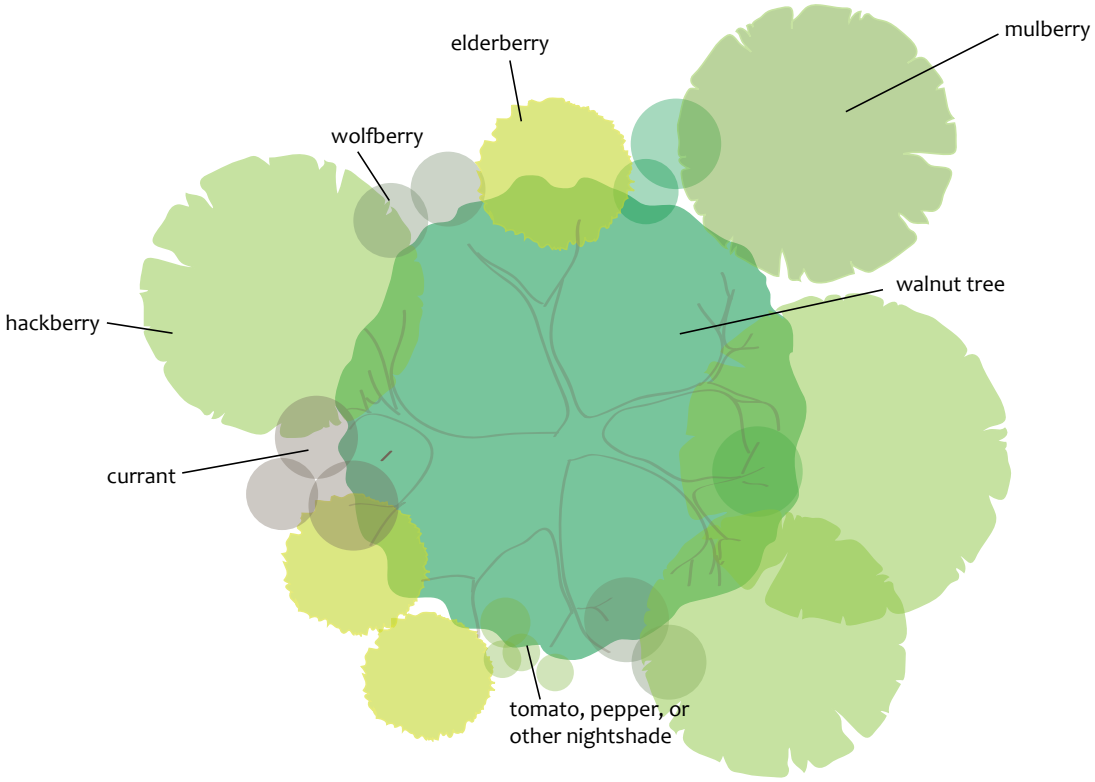


Figure 2.3 Walnut tree guild diagram

Adapted from: Toby Hemenway, *Gaia's Garden: A Guide to Home Scale Permaculture,* White River Junction, VT: Chelsea Green Publishing Company, 2009, Print.

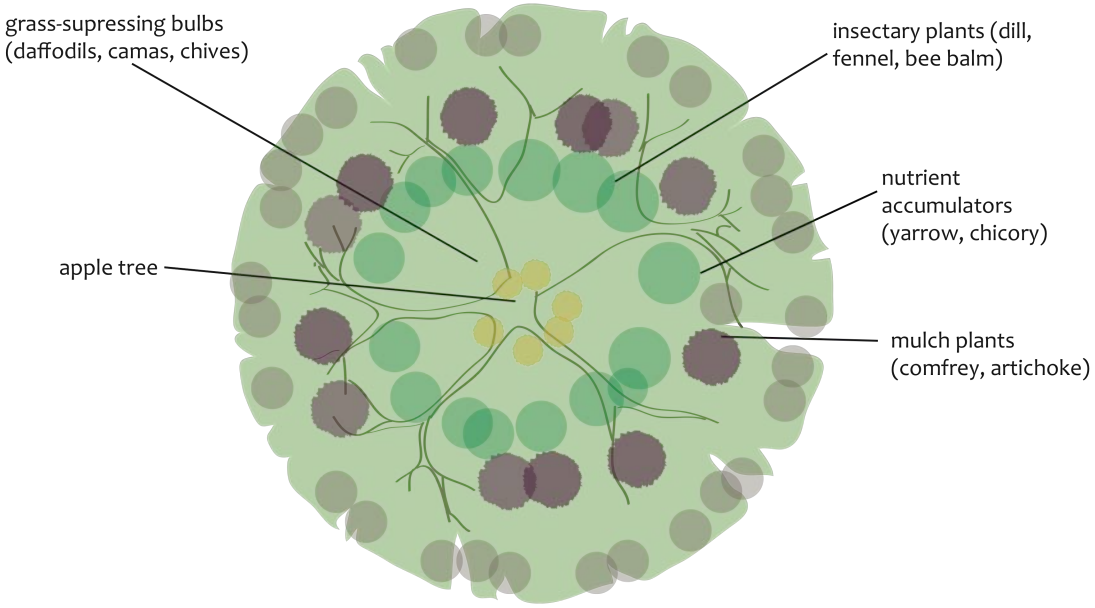


Figure 2.4 Apple tree guild

Adapted from: Toby Hemenway, *Gaia's Garden: A Guide to Home Scale Permaculture,* White River Junction, VT: Chelsea Green Publishing Company, 2009, Print.

Once a series of guilds are established, the next step is to situate them within a larger system. In this study, forest gardens will be used on larger tracts of land. A forest garden contains plants in three layers: tree, shrub, and ground plants. Arranging these plants so they receive appropriate amounts of light, shade, water, and other essential elements is key in the forest garden (Hemenway 216).

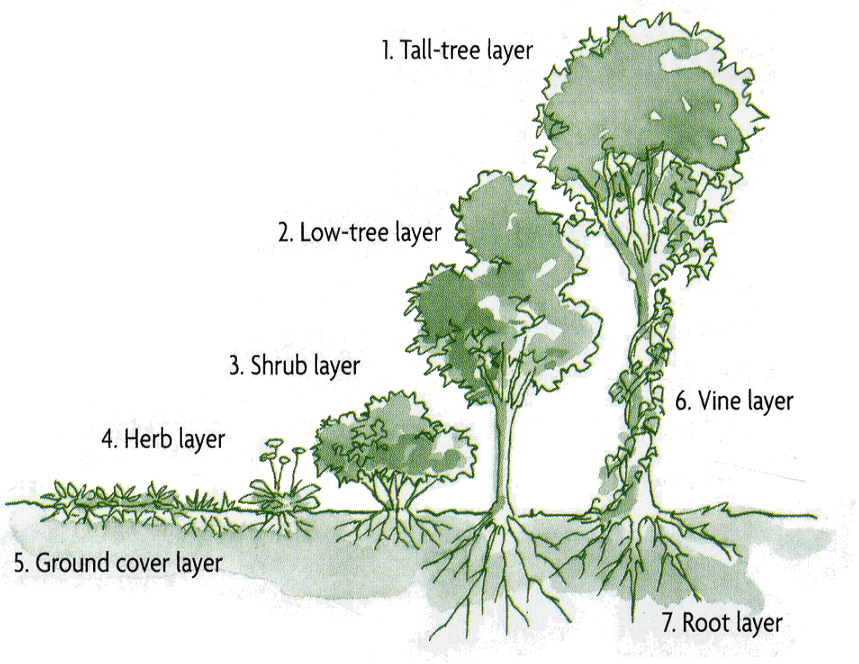


Figure 2.5 Layer of the forest garden

Source: Toby Hemenway, *Gaia's Garden: A Guide to Home Scale Permaculture,* White River Junction, VT: Chelsea Green Publishing Company, 2009, Print.

Post-Industrial Cities

Many older industrial communities in the U.S. are currently experiencing shrinking populations that are creating an abundance of vacant properties and empty lots. Shrinkage in cities is defined as "a post-World War II problem centered on the Great Lakes industrial region." Their shrinking populations stem from "American industrial decline, white flight, and suburban sprawl" (Gallagher 5). But, what these theories don't account for is the natural ebb and flow that naturally occurs in every city. Just because they have experienced a decline in population, the cities that comprise the Rust Belt should not be viewed as failures (Gallagher 7).

Schilling's article "Greening the Rust Belt" discusses the types of strategies such cities are applying in order to revitalize their neighborhoods (Schilling 451). His article discusses the importance of "right sizing" cities, or:

> "Stabilizing dysfunctional markets and distressed neighborhoods by more closely aligning a city's built environment with the needs of existing and foreseeable future populations by adjusting the amount of land available for development. Right sizing by replacing vacant and abandoned property with green infrastructure converts surplus, blighted land into green space. This creates community assets while aligning supply more closely with existing and foreseeable future levels of demand" Schilling 453).

Detroit has become one of the most talked about post-industrial cities in current literature as well as in the media. Once the nation's manufacturing hub, Detroit now has approximately 70,000 vacant lots, making up about twenty-seven percent of its 139 square miles. Since 1950, Detroit has lost one million residents and thousands of jobs (Bonfiglio 13).

John Gallagher's close examination of Detroit in his book *Reimagining Detroit* involves a careful assessment of the challenges the city is currently facing as well as the opportunities these challenges provide. The book opens with a letter by Jay Williams, mayor of Youngstown, Ohio. Williams compares Detroit, Youngstown, Cleveland, and Muncie, Indiana and states that these cities were once the backbone that sustained the middle class in America. But in the past several decades, each of the aforementioned cities

has fallen on hard times (Gallagher 1). Many of these cities have already begun to discover their untapped potential. Muncie, however, has yet to innovatively address many of its problems that resulted with the loss of a significant portion of the population.

Williams goes on to suggest that smaller cities are tailor made for innovation and the flexibility required to compete in a new global economy. Being smaller affords greening opportunities that would not have been available at the height of these cities' popularity (Gallagher 10). With significant amounts of open space now available, cities like Detroit have the unique opportunity to "think about reshaping the urban fabric-building up the stronger districts to be even healthier, and encouraging people to abandon the dying districts so the land there can be used for greenways or community gardens or other innovations" (Gallagher 11).

The urban gardening initiative is not new to Detroit, but rather there is a rich history there. During the depression of the 1890s, Mayor Hazen Pingree encouraged residents to garden and these gardens came to be known as Pingree's Potato Patches. During World War II, victory gardens were seen throughout the city and in the 1970s Mayor Coleman Young's Farm-a-Lot program allowed people to grow food on vacant land. In 1992, James Boggs and Grace Lee Boggs recognized that globalization and technology were taking away job opportunities so they began Detroit Summer, an organization aimed at envisioning a new and innovative future for Detroit (Bonfiglio 34).

The problems facing Detroit are very similar to those currently facing Muncie, Indiana. Muncie has an excess of abandoned properties throughout the city, which

creates problems associated with crime and the vitality of residential and commercial areas in these neighborhoods. Such problems also deter reinvestment in the area (Schilling 452). If these communities could use urban agriculture as an agent for stabilization, perhaps revitalization leading to reinvestment would follow. If no intervention takes place, it is likely that the trends in abandonment and decay will continue to become an even larger problem (Schilling 454).

John Kromer speaks of his experience working for the city of Philadelphia in his book, *Neighborhood Recovery*. He states the following, which is highly relevant to the circumstances facing many of the communities in Muncie, Indiana:

> "Blighted urban neighborhoods, particularly the older communities left behind in the wreckage of the American industrial age, are today's biggest threat to the economic well-being of the cities and metropolitan regions where they are located. The only way to overcome this threat is by solving a fundamental strategic problem: how do you bring stability and economic success to the places hardest hit by a half century or more of disinvestment?" (Kromer 8).

The large lots and park spaces in suburban neighborhoods are designed with planned emptiness in mind, which many people find incredibly desirable. With the amount of open space that has become available because of abandonment, "elbow room" that wasn't there before is now available (Gallagher 12). Many of these blighted neighborhoods have the opportunity to re-brand themselves as communities with desirable amenities, such as green space.

The Muncie Action Plan (MAP) is a five-year plan outlining the vision for the future of the city. Among the issues addressed is an integrated approach to land use and reuse. The plan cites the fact that the city of Muncie's land area has increased while the number of households has decreased. The high rates of poverty and unemployment concentrated in the southern portion of the city are also discussed in the plan. MAP outlines an initiative to create more attractive and desirable places within the city utilizing the existing blight removal plan, community based neighborhood enhancement programs and the institution of a land banking system. They feel that the improved appearance of neighborhoods will promote attitudes of safety and community (MAP).

A New Food System

Advocates of urban farming argue that urban neighborhoods without a reliable supply of healthy food "desperately need the nutritional and economic subsistence that urban farming can provide." Farming also requires low start-up costs as well as little skill and/or experience and is well suited to existing conditions found in many neighborhoods (Flisram 16). Choices regarding what to grow are also very important. "Food that is locally grown and sold needs to be culturally appropriate," Will Allen stated (Flisram 16). He goes on to say that items that are marketable and sell quickly in a trendy market may sit unsold on grocery store shelves depending on the cultural tastes and food traditions of the local population.

An integrated food system where farming, processing, packaging, preservation, distribution, wholesaling and retailing are all coordinated within close proximity make

urban agriculture an economically viable alternative to current food production and distribution methods. But achieving all of this in the urban setting presents many challenges because of the compact nature of most cities (Flisram 18).

> "Most people's idea of urban ag is just production. It's really more about developing the whole economy around food in cities and closing the loop between production and consumption in a way that maximizes economic capture and sustainability. It's about the guy providing the compost, the seed and tool suppliers, and the company manufacturing the greenhouse" (Flisram 18).

City Farm, a one-acre farm on vacant urban land in the city of Chicago is a non-profit organization that sells 10,000 to 20,000 lbs. of food to high end restaurants out if it's farm stand, at farmer's markets, and to people who purchase shares of it's crops each year. Chicago, along with other cities across the country, are giving urban farming a boost by changing regulations that limit the size of farms, and loosening regulations surrounding parking and fencing. Other cities including Salt Lake City, Columbia, Missouri, Cedar Rapids, Iowa, Boise, and Detroit are altering regulations to better accommodate urban agriculture (Keen).

The late Thomas Lyson coined the term "civic agriculture," which he described as:

> "a commitment to developing and strengthening an economically, environmentally, and socially sustainable system of agriculture and food production that relies on local resources and serves local market and consumers. The imperative to earn a profit is filtered through a set of cooperative and

mutually supporting social relations. Community problem solving rather than individual competition is the foundation of civic agriculture" (Nordahl 10).

Food Distribution

The highly centralized nature of our current food-supply system also means that isolated agricultural problems have the potential to be (and are) felt nationwide (Nordahl 5). In 2008, the Great Salsa scare sent the American public into a panic when it was discovered that tomatoes and peppers used in the production of fresh salsa for numerous Mexican restaurants had been contaminated with Salmonella. At first, the outbreak seemed confined to Texas and New Mexico, but after four months the Salmonella tainted salsa had sickened 1,442 people in forty-three out of the fifty states (Nordahl 24). In his book, *Public Produce*, Nordahl states: "As a measure of insurance, this is perhaps reason enough to employ a more local, public system of food" (Nordahl 5).

A New Diet

Researchers at Cornell University found a dramatic difference in the acreage of land needed to sustain a diet that is low in fat and low in meat consumption in comparison to a high fat, high meat diet. As previously mentioned, a person consuming a low fat, low meat diet will require less than half an acre of land to produce enough food to sustain them for one year. A low fat diet with a high amount of meat consumption will require more than two acres of land (Peters).

> "Importantly, even though all the vegetarian diets require less land than the meat diets, they do not necessarily feed the most people. Because different soil types are suited to different crops (some of which are not consumed directly by humans), more people can be fed when their diets are not strictly vegetarian" (Peters).

The reason is that growing the fruits, grains and vegetables that sustain a vegetarian diet require a higher quality of land. Land that is not suitable for growing these crops can be used for raising livestock. It is often the case that more land is readily available for raising animals for eggs, milk, and meat than there is for the production of fruit, grains, and vegetables, making it theoretically possible to feed more people who consume a moderate amount of meat than it would be to sustain those whose diets are strictly vegetarian (Peters).

"Modest" meat consumption is the key to making this feasible. Additional meat production would require the use of land that is better suited for growing plant foods and disturb the balance. Modest meat consumption is defined in this study as two cooked ounces per day of meat and eggs (in 2005 the average American consumed 6 oz. per day) (Peters).

Designing for Food Productivity

Various models of farming and urban agriculture are something that are only very recently being addressed by landscape and planning disciplines, so little information exists on ways to go about implementing these practices. Some of the reasons urban

agriculture has been overlooked in the past are that professionals in these fields felt that the food system "was not their turf," and that land-use and the built environment were their primary responsibilities. Perhaps the biggest problem of all is that many professionals did not perceive any problems with the existing food systems in place and also reported having a lack of knowledge about such systems (Mendes 437).

Matthew Redmond, the brains behind Agriburbia©, is one of the few to address these problems with his creation of a development that combines rural living with urban culture. When Redmond first presented his idea at a town board meeting eight years ago, he was laughed out of the room. Today, there are over 3,000 acres of Agriburbia© projects being developed across the country (Chaffin).

Agriburbia© is both an economic movement as well as a design model that encourages development that integrates "aspects of Agrarianism, along with contemporary design methods and other environmentally sound principals of real estate development" (TSR Group). The Agriburbia© concept combines the positive physical, cultural, and financial characteristics from rural and urban land use models to create an entirely new model for development (TSR Group).

The Farmstead, an Agriburbia© Development in Granite Quarry, North Carolina, has approximately fifteen acres of land that is dedicated solely to intensive agricultural production and is tended by a professional farmer. Although the type of farming in this area is intensive, it is still done with the highest concern for the environmental and conservation. The fruits and vegetables produced on this land will provide food for the

neighborhood and some will be sold in order to provide revenue for the local homeowners' association (TSR Group).

In addition to the fifteen acres of farmland, homeowners will have the option to participate in the Steward Farm programs that allows residents to host a "micro-farm" that will be tended by the professional farmer. Homeowners have the option to participate as much or as little as they choose. A sliding scale for dividing the profits will account for the amount of land, time, and produce contributed by individuals (TSR Group).

Another solution is for municipalities to become involved in creating policies that exploit the food growing and distribution potential of public spaces within communities without sufficient access to healthy, safe foods. This would ensure, at a minimum, that wholesome food is as prevalent as the less healthy options (Nordahl 38).

Nordahl discusses how public space design can incorporate these needs. He states, "Successful public space design in this country must respond to the needs and desires of a pluralistic society. The goal of the public space designer is to ensure that the qualities and components comprising the physical space of the public realm provide the greatest value to all members of the community" (Nordahl 43).

Chapter 3

Best Practices in Landscape Architecture: A Series of Exemplary Case Studies

The following are five exemplary case studies and each is worth looking at closely for a unique reason. The examples range from non-profit organizations with grass roots beginnings to iconic examples of design within the field of landscape architecture. The peak oil crisis in Havana, Cuba is a lesson in what can be accomplished when a nation is on the brink of starvation and the way of life they had always known is no longer an option.

Together, these five case studies provide a broad range of results, but each with a common goal: to integrate food production into the local landscape, both physically and culturally.

Earthworks

Detroit, Michigan, once the nation's manufacturing hub, has lost approximately one million residents and hundreds of thousands of jobs since the early 1960s. Today, there are over 70,000 vacant lots, which make up almost thirty-percent of the city's 139 square miles (Bonfiglio 33).

Earthworks is a network of community gardens that span three blocks not far from the city's downtown. Each garden is located on a previously vacant property surrounding the Capuchin Soup Kitchen run by the Capuchin Franciscan Family. The gardens are used to grow healthy foods for the soup kitchen as well as a food bank located adjacent to one of the gardens.

Earthworks was founded by Brother Rick Samyn in 1997, to help him better care for the underprivileged by providing healthy food. Another goal of Earthworks is aide in educating the public about healthy eating and promote the consumption of fresh production. The hallmark of the Capuchin Franciscan family is to be in relationship with all of creation and the mission of the Capuchin Soup Kitchen is to feed the hungry and care for the poor. Together, these two visions identified a need to address the "systemic causes of poverty, broken relationships, and a wounded earth" ("Earthworks Urban Farm").

Since it's founding, Earthworks has met with continued success and has grown to include additional garden plots, a greenhouse, and an apiary. The key to Earthworks' success has been their continued collaboration with various organizations and community groups. One example of this collaboration is with the Wayne County

Department of Health to strengthen Project FRESH, which promotes the consumption of fresh produce to low-income families with children ("Earthworks Urban Farm").

Figure 3.1 Images from Earthworks, Detroit, Michigan (author photos)

Berkeley Community Gardens

Berkeley Community Garden is one of the largest community gardens in Boston. The garden was founded in the 1960s after townhouses on the block were torn down as a part of an urban renewal initiative and members of the Chinese community immediately began cultivating the land. Today there are more than 150 plots and a wide range of users from kindergarten classes to individual residents from the surrounding neighborhoods. Visitors to the garden can expect to see a great diversity of plant life from traditional Asian vegetables to English-inspired gardens. The garden is also now a protected land and is managed by an umbrella non-profit called the South End/lower Roxbury Open Space Land Trust making this space safe from any future development ("Berkeley Community Gardens").

The Berkeley gardens began as a grass roots movement by just a few residents living around the vacant property and have grown into an exemplary model for

community gardens. They demonstrate the ability of a garden to foster community identity and involvement.

Figure 3.2 Images of the Berkeley Community Gardens

Source: "Berkeley Community Garden," *Berkeley Garden Main Page*, Berkeley Community Garden, Web, 23 Jan. 2012.

Growing Power

"Grow. Bloom. Thrive." is the credo of Will Allen, founder of the non-profit organization Growing Power in Milwaukee, Wisconsin. Allen, along with other advocates of urban agriculture, wants to reconnect people in urban areas to the earth. At the same time, he also aims to lessen the effects of food deserts and areas that have been abandoned by large supermarkets along with the rest of their economic base (Flisram 15).

Growing Power uses a different model than many entrepreneurial urban agriculture endeavors and instead focuses on creating "community food centers" where residents come to learn sustainable practices for growing, processing, marketing, and distributing food. Several interrelated movements have given urban farming operations like Allen's the momentum to grow and thrive. Slow food, "buy local" campaigns, the popularity of organic produce, green city initiatives, food safety concerns, and an increase in farmers' markets have all brought continued success to smaller operations like Growing Power (Flisram 15).

Growing Power is an exemplary model of using urban agriculture as an opportunity to educate young people, while also addressing the community's need for access to safe, healthy foods.

Figure 3.3 Will Allen, Founder of Growing Power

Village Homes

Village Homes is a community of 240 homes within 18 pocket neighborhoods located on seventy-five acre site in Davis, California. The community is largely

considered the first "green" neighborhood. Although the community seemed cutting edge when it was completed, Michael and Judy Corbett drew directly from Ebeneezer Howard's 1899 vision of a garden city and the 1929 plan for Radburn, New Jersey (Chapin 125).

Edible plant material such as fruit and nut trees make up a large component of the plants throughout the community. The edible landscape produces oranges, almonds, apricots, pears, persimmons, peaches, plums, cherries, and grapes. In addition to the permanent edible landscape, community gardens are also located on the west side of the development where residents grow vegetables, herbs, and flowers. The produces grown in community gardens is used by residents and also sold at farmers markets and to local restaurants (Chapin 126).

Figure 3.4 Village Homes, Davis, California

Source: "Village Homes of Davis, California. My Number ONE Holiday Destination." *PermaCultured.com.au – Sustainability by Design*, 3 May 2010, Web. 21 Mar. 2012.

There are approximately twelve acres of orchards throughout the site as well as five acres of allotment gardens. Many residents also use their own yards to create small vegetable plots. The percentage of food requirements met onsite varies among the households but is as high as ninety per cent. Village Homes also collects stormwater run-

off that is diverted into a network of swales and streams that meander through the greenbelts to reduce the amount of watering needed (Webb 17).

Village homes serves as an exemplary case study because of the way agriculture and edible plant material are incorporated into everyday landscape. This development is also a successful neighborhood design that helps foster a strong sense of community identity among residents.

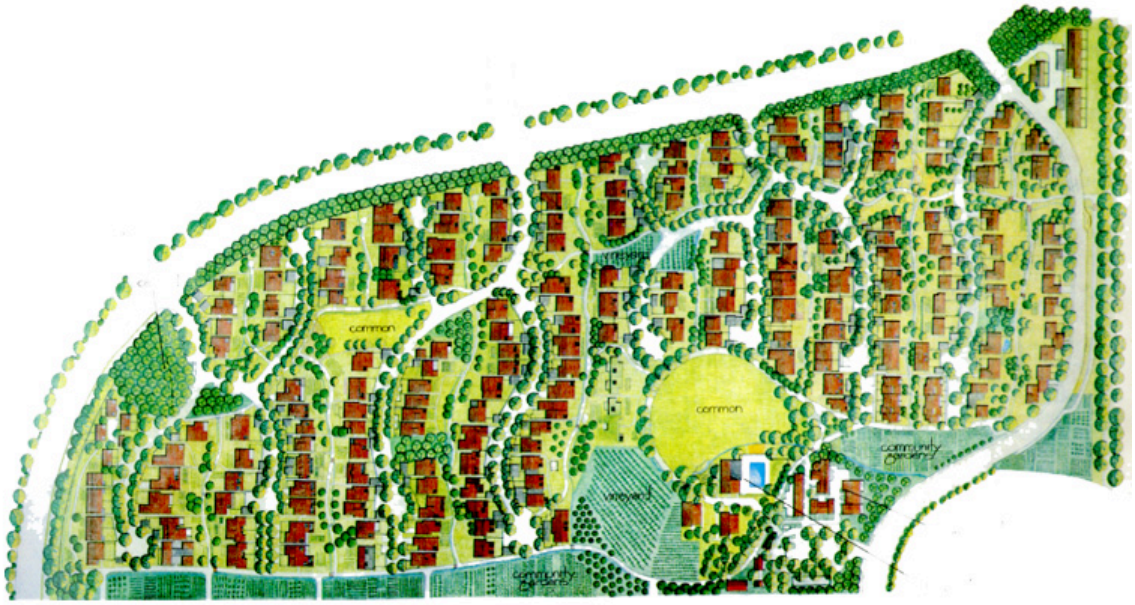


Figure 3.5 Plan of Village Homes

Source: Francis, Mark. *Village Homes: A Community by Design*. Washington, DC: Island, 2003. Print.

Havana, Cuba

In the early 1990s, the peak oil crisis led to a national food crisis in Cuba. The collapse of the Soviet Union and the sudden end of trade with COMECON meant a very

sudden scarcity of fuel, machinery, and parts needed for the large-scale industrial agriculture that Cuba had been practicing since the 1970s (Koont). People began squatting in the city and converting every piece of available land to agricultural production. Every vacant lot was converted to an orchard to prevent famine (Morgan).

The shift to small-scale urban agriculture minimized the need for machinery as well as transportation costs. Since most of these new productive areas were in closer proximity to large concentrations of people and certain fertilizers and pesticides were also no longer available, agro-ecological practices were also employed (Koont).

Over the past fifteen years, Cuba has developed one of the most successful examples of urban agriculture in the world. The capital city of Havana has played a prominent role in the evolution and revolution of urban agricultural practices (Koont). The term "urban agriculture" is more inclusive in its Cuban context than its typical use in the United States. In Cuba, urban agriculture includes larger expanses of land, suburban cultivation as well as urban fringe areas (Koont).

Today, eighty percent of agricultural production in Cuba is organic today and farmers are now among the highest paid professions (Morgan). The success of the shift to urban agriculture in Cuba is perhaps most evident in the sheer amount of food they have been able to produce for residents. The tables below show how significant the increase in agricultural production Cuba has been since their national crisis in the early 1990s (Koont).

Table 1. Annual production of vegetables in Havana

	Year	Thousands of metric tons
	1997	20.7
	1998	49.9
	1999	62.6
	2000	120.1
	2001	132.2
	2002	188.6
	2003	253.8
	2004	264.9
	2005	272.0

Figure 3.6 Annual production of vegetables in Havana from 1997 to 2005

Source: Sinan Koont, "The Urban Agriculture of Havana :: Monthly Review," *Monthly Review, An Independent Socialist Magazine*, Monthly Review Foundation, Jan. 2009, Web. 21 Mar. 2012.

Table 2. Annual production of selected crops in Havana

Crop	2001 Thousands of metric tons	Annual growth 1999-2001 (percent)
Banana (cooking)	1.9	8.0
Banana (fruit)	0.8	13.2
Fruits	21.1	8.4
Root crops	21.0	10.2
Beans	2.4	29.9
Rice	0.6	21.9

Figure 3.7 Annual production of selected crops

Source: Sinan Koont, "The Urban Agriculture of Havana :: Monthly Review," *Monthly Review, An Independent Socialist Magazine*, Monthly Review Foundation, Jan. 2009, Web. 21 Mar. 2012.

Figure 3.8 Urban Agriculture in Havana, Cuba

Source: Helen Morgan, "Gallery: Urban Farming Movement Sweeps..." *Urban Farming Movement Sweeps Across Havana, Cuba,* Inhabit, 18 Aug. 2011, Web. 21 Mar. 2012.

Figure 3.9 Urban Agriculture in Havana, Cuba

Source: Helen Morgan, "Gallery: Urban Farming Movement Sweeps..." *Urban Farming Movement Sweeps Across Havana, Cuba,* Inhabit, 18 Aug. 2011, Web. 21 Mar. 2012.

Schreber Gardens

The Schreber Gardens are deeply rooted in the history of Germany dating back to the 1860s and have also greatly evolved since their beginning. In 1864, an educational associated founded to encourage children to participate in supervised games outdoors and named (somewhat arbitrarily) for Dr. Daniel Gottlob Moritz Schreber who was a proponent of improving the physical and moral health of people. Several years after the founding of the Schreber Association, parents planted flowerbeds on the edge of a playground and became known as the Schreber Gardens (Turowski).

At the same time, Berlin was undergoing an enormous population shift and becoming the largest tenement city in the world and a hotbed of social problems. Summerhouse colonies began to appear as if from no where as families began to flee the horrific living conditions and build summerhouses on empty land that had been purchased for future real estate investment. Small gardens and fences were often erected around each summer home in order to improve these families' financial situations (Turowski).

At the beginning of the twentieth century, Schreber gardeners were organized based on their political positions and interests. Like the gardeners who founded the Schreber Association, some were civic minded, while like those in Berlin, some were proletarian-influenced. In 1921, all political associations were relinquished and the separate affiliations were merged into a single entity. Although the Schreber gardens were

now depoliticized, they still remained a fringe movement and were still considered suspicious by local authorities (Turowski).

After World War II ended, every piece of available land was put to use producing fruits and vegetables throughout many of the damaged cities. Schreber gardens also became temporary housing for those who had lost their homes in the bombings. As the state of the country continued to improve, the need for produce from the Schreber gardens diminished along with their role in the social structure of post war Germany (Turowski).

Figure 3.10 Schreber Gardens, Germany

Source: Jan Turowski, "The Schreber Garden," Editorial, *The Cabinet,* Cabinet Magazine, Issue 6 Spring 2002, Web. 23 Jan. 2012.

Today, the Schreber gardens represent an important piece of history and German folk culture and are still inhabited by mainly lower-middle class laborers (Turowski). Their long history also illustrates how critical land and productive space becomes during times of adversity. Having access to fresh produce during times of hardship becomes crucial to the survival of people and cities. If such access is woven into the fabric of a community, that community could become much more resilient during such times.

Conclusions

These case studies offer a very diverse set of strategies for implementing urban agricultural practices into landscapes of varying types and scales. While not every aspect of each of these examples is applicable to this study, there are specific elements of each that will be utilized in the creation of a new set of strategies.

Earthworks in Detroit, Michigan is a valuable example because of Detroit's similarities to Muncie. Both have industrial histories and have experienced a significant population loss. They way they are addressing problems with vacant property by weaving community gardens into existing neighborhoods in some parts of the city can serve as a model for addressing similar small scale spaces in Muncie.

Much of Earthworks' success has been attributed to their close partnerships with other community organizations. This is an important lesson in creating an urban agriculture venture that can be successful in the long run.

The Berkeley Community Gardens are an exemplary model of how gardens can foster community involvement and strengthen a sense of identity. While the focus of this

study will be permaculture, there is still a place for a more traditional approach to agriculture in some parts of the design.

The ideas behind Growing Power's community food centers will serve as a valuable model for the creation of similar hubs within the community in Muncie. The community food center will be the central location where processing, distribution, marketing, and education take place.

The way edible plants are woven into the everyday landscape in the design of Village Homes serves as a model for the type of food-centered landscape that could exist within a community.

The shift away from large-scale, industrial agriculture in Cuba in the 1990s is an impressive example of how mid-sized urban agriculture can be introduced into existing urban settings. Much of the spaces used for production are larger than the single vacant lots discussed in Detroit, but small enough to be interwoven into existing infrastructure.

Chapter 4:

Site Inventory and Analysis

The Site: Muncie's South-Central Neighborhood

The site for this design is the South-Central Neighborhood in Muncie. The site is defined by Memorial Drive (also known as 12th Street) to the south, S. Hoyt Avenue to the west, E. Willard St. on its north edge, and S. Madison St. to the east.

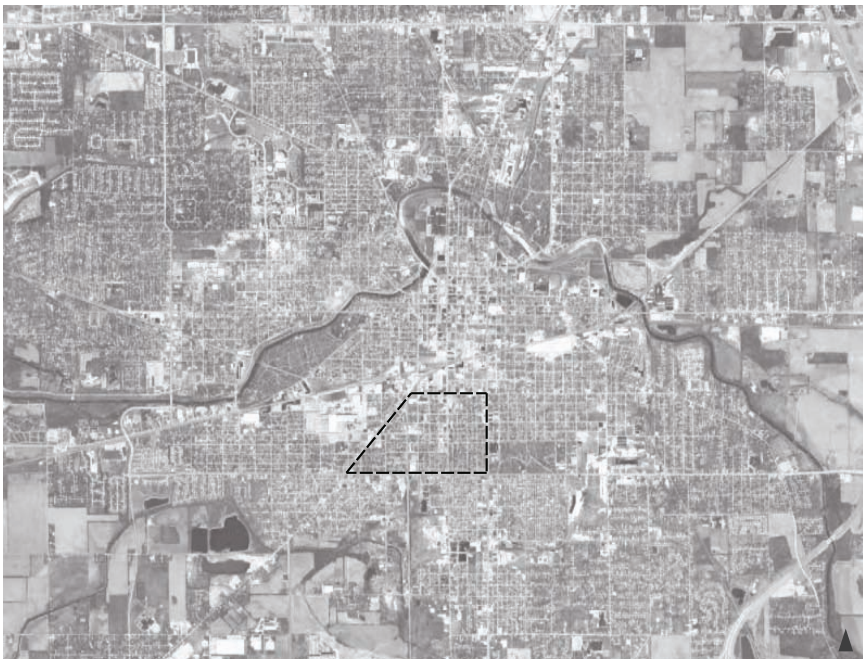


Figure 4.1 Site location in Muncie

This site is located in close proximity to downtown Muncie and many empty portions of the Walnut and Madison Street corridors could be desirable infill sites. They are located in an area with strong linkages and close proximity to downtown as well as to the surrounding residential areas. The site offers many opportunities to create connections throughout the community while designing within the constraints of existing development and community context.

The South-Central neighborhood also has several grass roots movements underway that encourage food production in small neighborhood gardens. A community garden located on the corner of 6th and Jefferson Streets is overseen by Urban Light Community Church. Established in 2003, the garden is used as a tool to encourage community involvement and interaction. Anyone is welcome to participate in planting,

harvest, or maintaining the formerly vacant lot throughout the growing season. Parties are held twice a year in the garden to celebrate spring planting and fall harvest ("Ministries").

Figure 4.2 Community Garden on the corner of 6th and Jefferson in Muncie

Source: "Ministiries," *Urban Light Community Church*, Web. 7 Feb. 2012.

A Brief History of Muncie, Indiana

Muncie: America's Hometown

Muncie, Indiana became nationally known after a team of sociologists led by Robert and Helen Lyn conducted a series of studies in the 1920s and 1930s and coined the city Middletown. They used the name Middletown because they considered it to be a typical middle-American community. Still today, researchers throughout the country give Muncie extra attention as "America's Hometown" (Community profile).

In the early 1920s, Muncie developed into the manufacturing center for central Indiana. The city's extensive rail network made Muncie an ideal place to locate for several national corporations. The auto parts industry was the most dominant type of manufacturing located in Muncie. The prevalence of manufacturing provided Muncie with a sense of identity as a place "where people made things" and contributed to a better quality of life for many Muncie residents (Geelhoed).

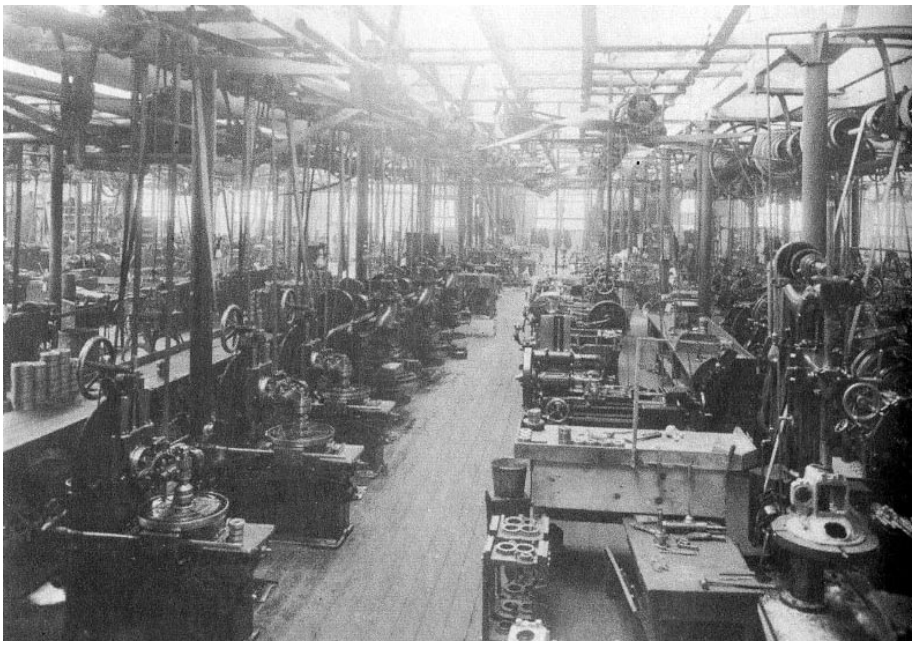


Figure 4.2 Inside the Borg Warner Factory

Source: Bruce E. Geelhoed, *Muncie, the Middletown of America, Chicago, IL: Arcadia Pub., 2000, Print.*

Figure 4.3 Outside of a factory in Muncie, Indiana

Source: Bruce E. Geelhoed, *Muncie, the Middletown of America, Chicago, IL: Arcadia Pub., 2000, Print.*

Muncie's industrial development continued throughout the twentieth century until it's decline in the recession of the 1970s and 1980s (Geelhoed). In the mid-1990s, the deindustrialization of Muncie began to gather speed. Industrial corporations that had been located in Muncie for decades, one by one began to close. In 1996, the Borg Warner Automotive Corporation announced the sale of a large portion of the company to a Mexican corporation. Although the factory had not been in production for several years, the Ball Corporation opted to officially move their headquarters from Muncie to Bloomfield, Colorado in 1998. Not only did this move mean a loss in jobs for residents, but also that the city was losing its major corporate partner. Immediately following Ball Corporation's announcement of their plan to relocate, General Motors revealed that they were closing the Delco battery manufacturing plant in Muncie (Geelhoed).

Muncie Today

These developments left Muncie with a confused sense of identity as its years as an important manufacturing hub in the American Midwest swiftly came to an end (Geelhoed). Post-World War II, Muncie began to establish itself as a regional center for healthcare as well as higher education, but the community identity had always come from its industrial history. In recent years, civic leaders have emphasized initiatives in cultural activity and recreation in an effort to draw new business to the area (Geelhoed).

Although positive changes and initiatives are underway in Muncie, the scars of the sudden decline of an industrial stronghold still dominate much of the landscape. The 2010 census listed the population of Muncie as 70,085, which is an increase from the 2000

census, but still significantly lower than the peak population in 1980, prior to the industrial decline.

Figure 4.4 Indiana Steel and Wire factory in its current condition (author photo)

As a post-industrial city, Muncie offers opportunities and potential that many other cities do not. Smaller cities are tailor made for innovation and the flexibility required to compete in a new global economy. Being smaller affords greening opportunities that would not have been available at the height of these cities' popularity (Gallagher 10). With significant amounts of open space now available, cities like Detroit and Muncie have the unique opportunity to:

> "Think about reshaping the urban fabric- building up the stronger districts to be even healthier, and encouraging people to abandon the dying districts so the land there can be used for greenways or community gardens or other innovations" (Gallagher 11).

Joseph Schilling introduced the idea of "right sizing" in his article "Greening the Rust Belt." Right sizing is described as:

> Stabilizing dysfunctional markets and distressed neighborhoods by more closely aligning a city's built environment with the needs of existing and foreseeable future populations by adjusting the amount of land available for development. Right sizing by replacing vacant and abandoned property with green infrastructure converts surplus, blighted land into green space. This creates community assets while aligning supply more closely with existing and foreseeable future levels of demand (Schilling 453).

Implementing such changes are of great importance in order to stimulate reinvestment in a particular area. A surplus of blighted land and vacant properties deters reinvestment "creating market dysfunction and limiting the impact of public and nonprofit revitalization efforts" (Schilling 452). Excess blighted and vacant land also lowers land prices and property values (Schilling 452). It is important that revitalization efforts work to address these concerns in order to be successful. These efforts must also

address the needs of the community and the concerns of residents such as safety, job training, and neighborhood cohesion (Schilling 453).

These changes could ensure the viability of the city over the long term. They will also make it a more desirable place for people who currently inhabit those areas that are burdened with extensive blighted land and vacant properties.

Site Demographics

The site is approximately 220 acres in size and made up of U.S. census tracts three and four. The total population of the area is 3,673 residents. The population is primarily African American and Caucasian, each making up around forty-seven percent of the local population. While these numbers give the impression of a fairly equal ethnic distribution within the community, the site is fairly ethnically divided. The west side of the community is predominantly Caucasian, while the area between Walnut and Madison is predominantly African American (American Fact Finder).

Twenty-eight percent of residents are under the age of eighteen, ten percent are over sixty-five years old, and the remaining sixty-one percent are between the ages of eighteen and sixty-five (American Fact Finder).

There is more than a twenty-seven percent vacancy rate of residential units throughout the community (American Fact Finder). Building footprints only make up

around twenty-five percent of the land area, leaving three-quarters of the space potentially available for various design interventions.

Site Inventory

Many things were taken into consideration before deciding to use the South-Central neighborhood in Muncie as the site for this design exploration. Its location in proximity to highly trafficked streets like Walnut, Madison, and Memorial make it a highly visible area to the rest of the city. Many of these streets are also lined with commercial development, although sparse in some places. The adjacency of these commercial areas to residential communities makes them easily accessible throughout the community and often within walking distance for the majority of residents.

The land patterns in this area include large amounts of vacant property mixed directly into residential areas and make it an intriguing site for an exploration in urban permaculture. The diversity of land types within this site is one of many reasons it is so intriguing. Along the northern and western edges of the site there is a significant amount of industrial land. An active railroad line runs north south near the western site boundary.

Figure 4.5 Location of vacant properties in a typical area of the site

The map below shows the location of the selected site in Muncie as well as its local context. The site is located in a predominantly residential area that has almost every possible other land use within close proximity. Downtown Muncie is located directly north of the site within a relatively short walking distance. There are also important community amenities such as libraries, schools, and one large park immediately adjacent to the site. Actively used and vacant industrial complexes also remain in the area immediately surrounding the site.

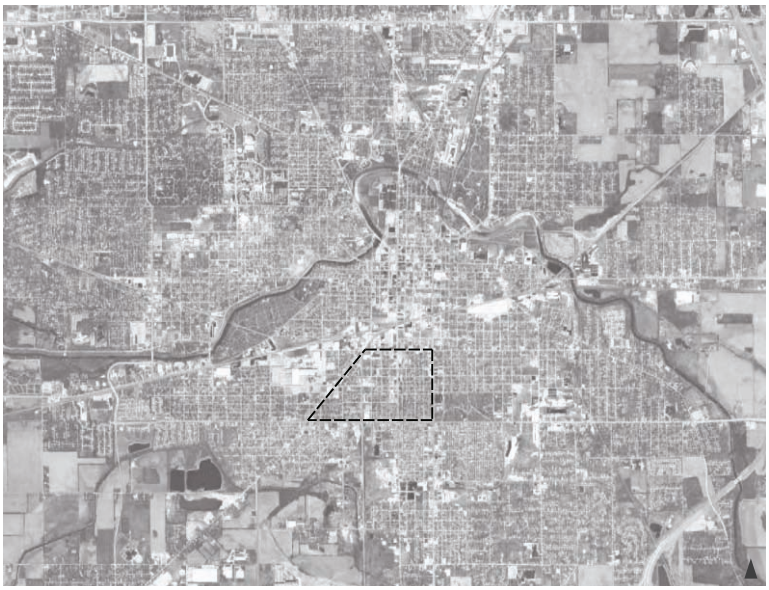


Figure 4.6 Site location in Muncie

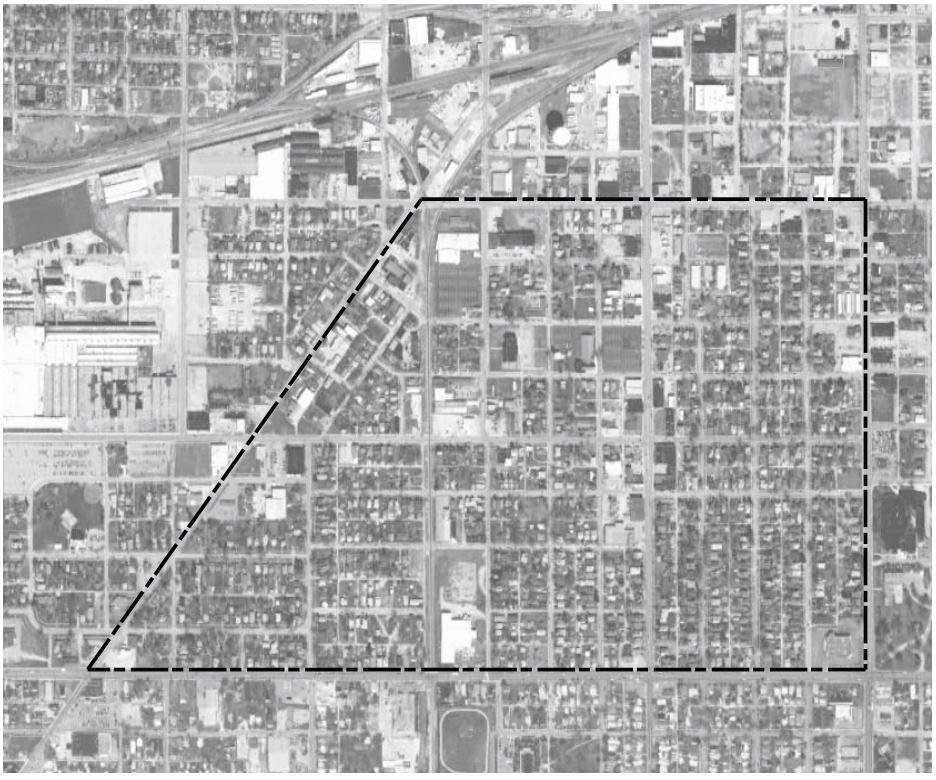


Figure 4.7 Site boundaries

This figure ground shows the patterns of building footprints throughout the identified site as well as the area surrounding the site. The large pockets of open space throughout the site are one reason it was selected. These spaces provide opportunities to fill in spaces between existing developments and more successfully weave urban permaculture interventions into the existing urban fabric.

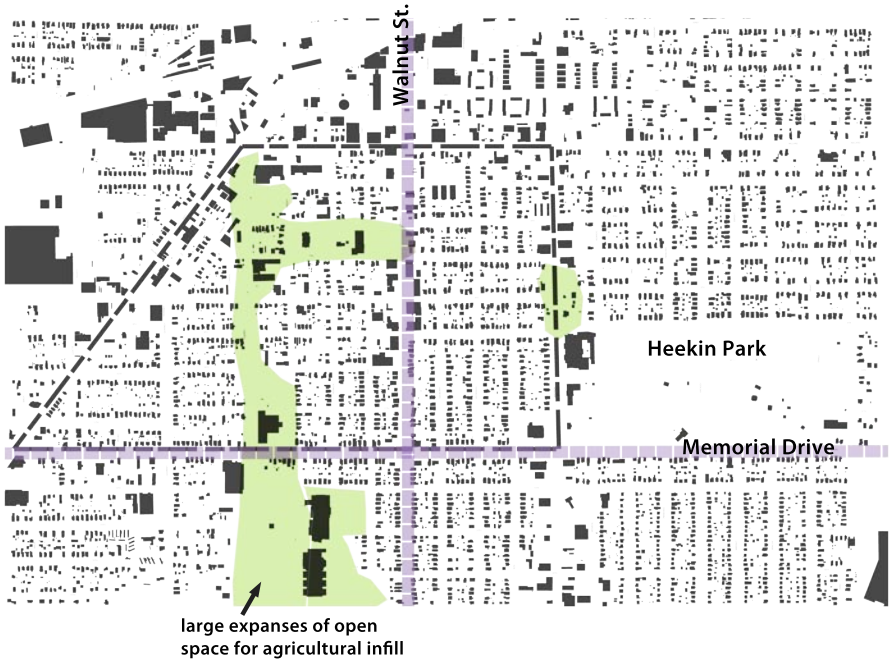


Figure 4.8 Figure-ground of the site and surrounding context

The map in Figure 4.9 illustrates the patterns of existing green space throughout Muncie. Much of the city's greenspace lies along the White River and directly north of the river at the Minnetrista Cultural Center and McCulloch Park. There is a great need for more easily accessible green space in the southern portion of the city. Heekin Park is

located immediately to the east of the site boundaries. While it is a large expanse of greenspace, it is a somewhat poorly designed space that is not generally considered a safe place. According to local newspapers, within the past two years, a shooting occurred in the park, an alleged crack house was shut down, and complaints have been made about large groups of people gathering, which in the past have had the tendency to become violent.

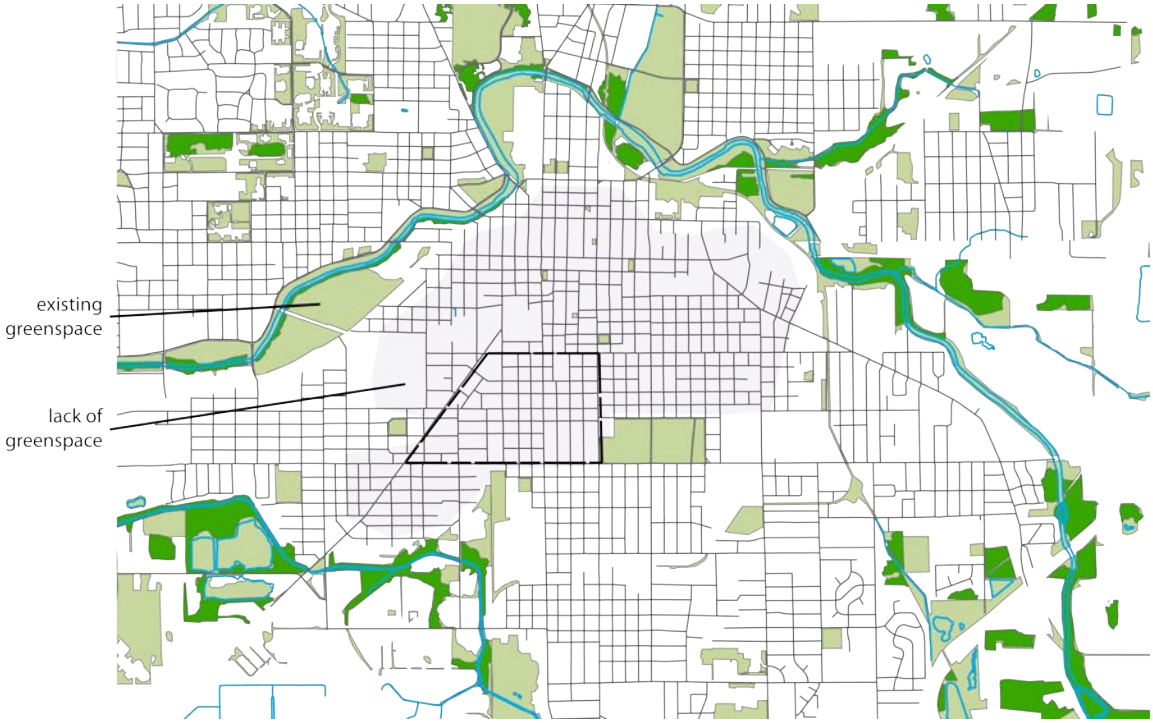


Figure 4.9 Greenspace map of Muncie, Indiana

The final map illustrates the network of streets and alleys that currently exist within and surrounding the site. Much of this infrastructure is in great need of reinvestment and interventions in the design could provide the opportunity to address

these needs. This existing infrastructure can also provide some of the framework for creating a pedestrian network throughout the site. With a prevalence of vacant property throughout the community, some of the existing roadways are no longer necessary and could also be converted into pedestrian priority or pedestrian only streets. The map below identifies several portions of existing streets that are deemed unnecessary because of the amount of vacant property within that block.

The consistent use of alleys throughout the neighborhood also offers unique opportunities to create semi-private spaces that could be shared by members of a particular block.

Figure 4.10 Street, alley and parking map for the site

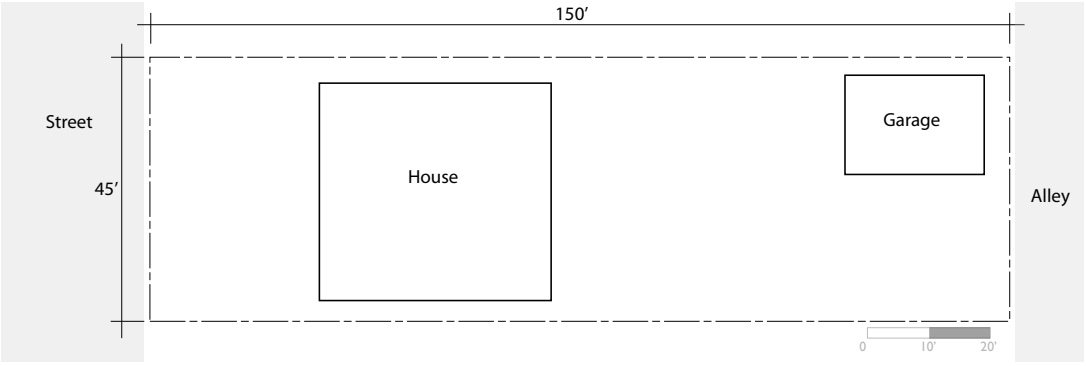


Figure 4.11 Diagram of a typical lot for the site

Site Analysis

Several patterns begin to emerge when looking at the South-Central neighborhood which make it an ideal site for this design exploration. The predominance of vacant property is one of the most notable land patterns throughout the community. Almost every block contains at least one vacant lot and there are large expanses of vacant or underutilized property along two of the main north-south commercial corridors: Walnut Street and Madison Street. These spaces offer the opportunity for permaculture installations and other improvements to be highly visible not only to community residents, but to others who are passing through on these thoroughfares.

In doing the site analysis, it became apparent that an important intersection of desirable traits occurred near the intersection of Walnut Street with 6th and 7th streets. There are large expanses of vacant or underutilized land, it is along a heavily travelled north-south thoroughfare that leads directly to downtown, and contains existing commercial development. A large church and a church run education center are also located just west of this intersection.

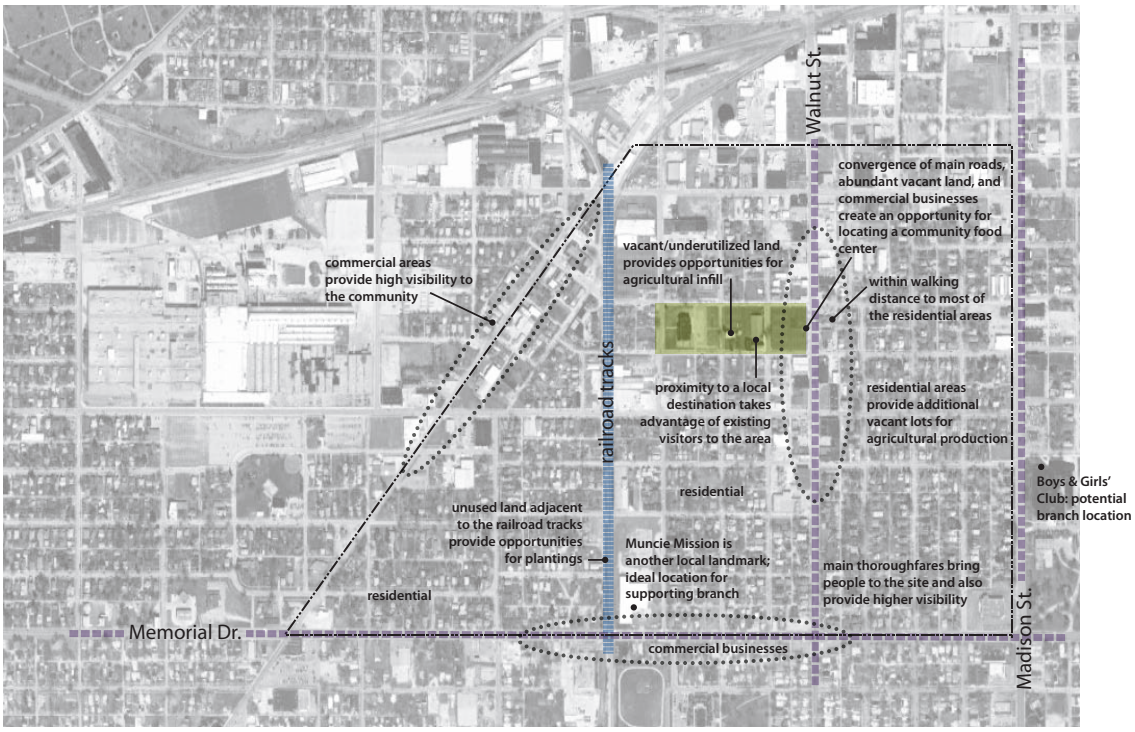


Figure 4.12 Opportunities and constraints on the site

Conclusions

The presence of many desirable attributes makes the intersection of Walnut Street with 6th and 7th Streets a prime location for locating the local community food center. The areas adjacent to the Muncie Mission and the Boys and Girls' Club are also desirable locations that could provide supporting branches for the community food center. These locations also provide opportunities to partner with these organizations.

Chapter 5

Design Development

The goal of this design is to create a series of interventions for the South-Central Neighborhood that will contribute to a culture of food production where the community can feel in control of their personal food choices. Allowing residents to be involved in food production will also provide an educational opportunity to better inform the community about all of the resources that are involved in food production.

The design will focus on interventions that fall into three categories: a community food center, a network of pedestrian connections, and individual parcels of land. Together, these three types of interventions will work together to create a system of destinations and linkages that provide better access to food.

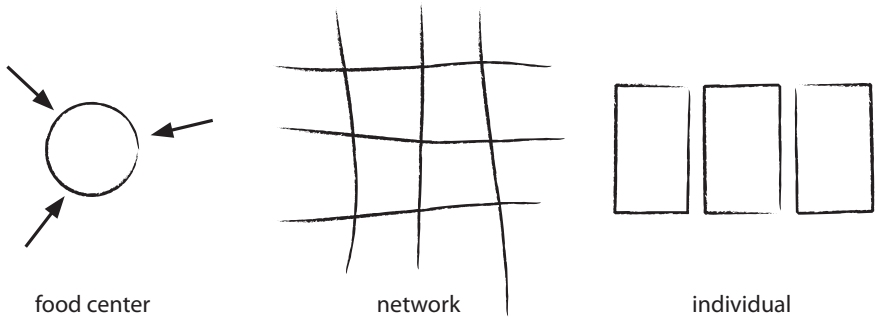


Figure 5.1 Design intervention types

These interventions create opportunities to reinvest in infrastructure where it is greatly in need of repair. Advancements in roads, pedestrian walkways, and alleys, when paired with permaculture installations, have the potential to beautify numerous places within the community while also bettering the quality of life available to residents.

Opportunities for economic gain are also incorporated into the overall design scheme. The income provided by the sale of produce will help to offset the income of families who do not make enough to get by while also providing every resident access to a wide array of healthy food choices. These changes to the community have the ability to become catalysts for future reinvestment in this and other neighborhoods beyond the scope of this design.

Project Goals and Objectives

I. Develop interventions for the existing community centered on healthy food production

a.) Identify locations for possible agricultural interventions

i. Determine locations that will have maximum visibility

ii. Locate interventions in close proximity to residents for greatest accessibility

II. Generate strategies that can be used to implement urban agriculture and permaculture at a variety of scales

a.) Create a model for a community food center

i. Incorporate spaces for processing, distribution, marketing, and education

b.) Create a network that connects the center to residents and other important destinations within the community

i. Create plans for converting existing streets into productive food corridors

ii. Develop a set of plans to retrofit existing alleys into spaces to grow food

c.) Generate prototypical plans to implement permaculture in small-scale spaces

i. Create lot-scale plans for the implementation of food production

III. Establish spaces that foster community improvement and neighborhood stabilization

a.) Design a operational system that encourage economic growth

b.) Create a design that encourages pedestrian activity within the community

c.) Designate spaces for educational opportunities

d.) Describe a food distribution system that lessens the impact of the problems with current food distribution methods

Program

A program is an outline of uses and spaces that a completed design will include. The program is based upon the needs of the client as well as the exploration of existing models through case studies. In this design exploration, the client is the South-Central community so the programmatic elements described below are tailored to best suit their needs.

Program:

This design proposal will include the following:

- A prototypical design for a community food center that is modeled after Growing Power and includes:
    - Agricultural production space
    - Community gathering spaces

    - A food processing and distribution center
    - An indoor and/or outdoor market space
    - Pedestrian access throughout the food center
    - Branch locations outside the main food center where residents can purchase food
- Pedestrian access to individual food centers from throughout the community
- Permaculture installations at a variety of scales on a variety of land types including:
  a.) Residential lot installations
  b.) Industrial land
  c.) Commercial areas
  d.) Park spaces

Conceptual Design

Agricultural production in this study will occur at three varying scales. The smallest scale will include suggestions for spaces such as individual residential lots and vacant lots. Mid-size spaces such as collections of lots or parcels of industrial land fall into the second tier. The largest scale consists of street plantings, parks, and those areas that are part of a network of pedestrian connections throughout the community.

Community Food Centers

A community food center includes productive agricultural land, community gathering spaces, as well as space for the processing, distribution, and sale of food produced within close proximity. It is designed to serve residents in the residential areas immediately surrounding the food center. Ideally, a single food center will be able to provide for a significant amount of the food needs for residents living within the community where a food center is located.

One community food center will be located within each neighborhood and other supporting locations are identified. These supporting locations would have, at the minimum, a space for the sale of food produced throughout the community. Other amenities such as park space or café could be introduced as appropriate. The most important aspect of the placement of community food centers and supporting branches is that they provide universal access to fresh, healthy foods to community residents within a short walking distance.

Locating the Community Food Center

A set of criteria was generated for choosing where potential community food centers should be located in order to make them most effective and impactful on the local community. Potential sites must be:

- within a five minute walk of the majority of the neighborhood
- located in close proximity to important community buildings
- surrounded by predominantly residential areas

- in close proximity to significant amount of vacant or abandoned property that could potentially be utilized by the community

The reason for each of these guidelines is explained in detail below.

1. Potential sites must be within a five-minute walk of the majority of the neighborhood.

Creating a better network of pedestrian access throughout the site that links community gathering spaces and commercial areas with the residential areas is greatly important in order to foster a commitment to healthier lifestyles. In order to create a better pedestrian network three strategies are implemented. First, underutilized streets are removed and transformed into pedestrian greenways that also serve as additional productive space. Alleys that have the potential to link important destinations are identified and retrofitted to better serve as pedestrian thoroughfares. Streetscapes are the third and final element to creating a better network. Each of these interventions uses permaculture as a guide for plant selection and design.

2. Potential sites must be located in close proximity to important community buildings.

Community buildings such as churches and charitable organizations serve as anchors within the community. They are important to the identity of the neighborhood and are places where people already frequently visit. Focusing design near these existing hubs will strengthen their longevity and better integrate them with the existing community.

Locating community food centers adjacent to important community organizations could also provide the opportunity to partner with these organizations in order to strengthen an individual program.

3. Potential sties must be surrounded by predominantly residential area.

It is important to locate food centers in close proximity to residential areas because the people already living within these communities are the people these centers are meant to serve. As previously discussed, it is important that these areas be within walking distance to residents in order for them to be universally accessible.

4. Potential sites must be in close proximity to significant amount of vacant or abandoned property that could potentially be utilized by the community.

Vacant and abandoned properties provide great opportunities to create spaces that the community is lacking. Productive agricultural land, parks, and community gathering places are a few of the ways abandoned and vacant properties will be utilized in this study. Creating these needed spaces will encourage community gathering and help give each neighborhood a better sense of identity. Intervening in these areas will help rid the community of places that are potentially dangerous while also beautifying the neighborhood. Another key goal of these interventions is to stimulate investment in the area.

Based upon the criteria, three potential locations have been identified within the South-Central neighborhood for community food centers. The map below shows these designated locations and the colored circles represent the area included within a five-minute walk from the center of each circle. The location labeled South-Central community food center was chosen for the central hub within this community. The other two locations could serve as small satellite branches of the main location in order to distribute food more equitably.

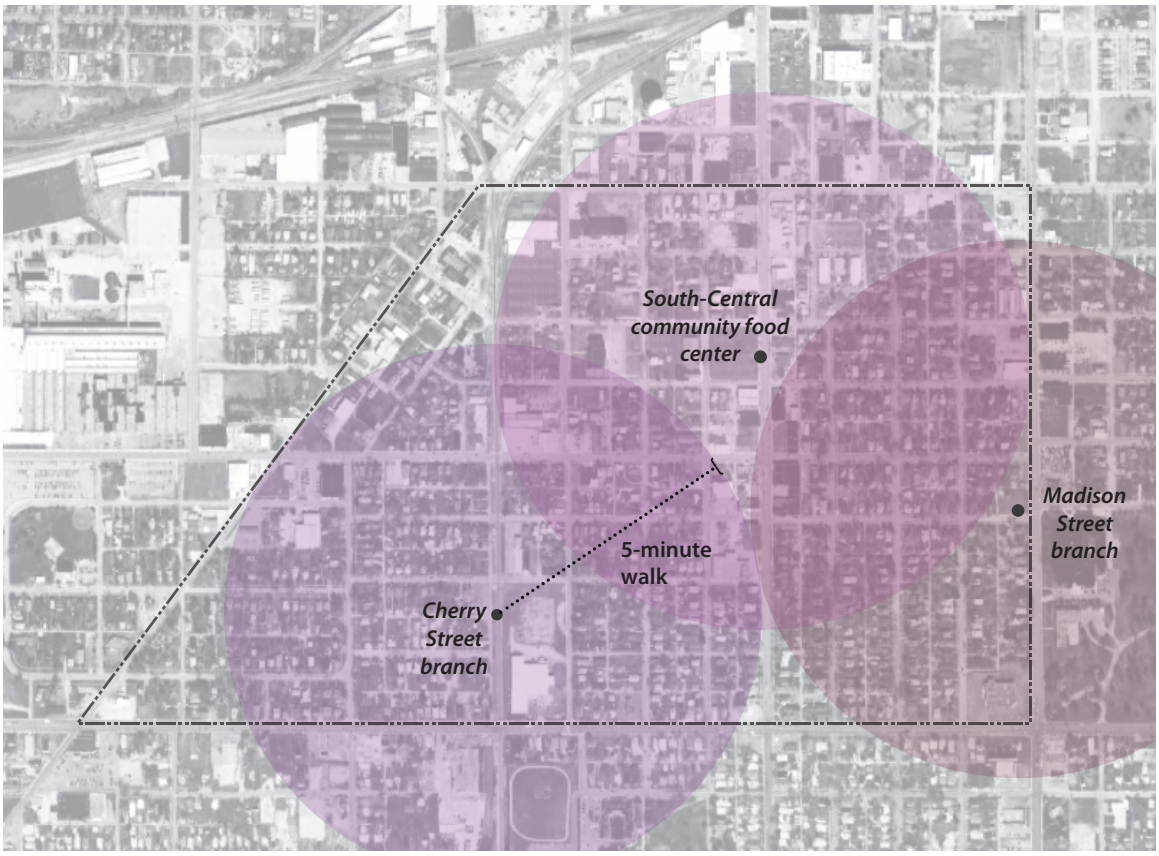


Figure 5.2 Location of the community food center and supporting branches

The South-Central community food center is the focus of this design exploration. The area of focus is designated on the map below in green and spans much of the width of the site from east to west between 6th and 7th Streets. This location will serve as the South-Central community food center. The other areas will serve as support centers with markets to buy food produce throughout the rest of the community.

Figure 5.3 Primary focus areas for design exploration

The diagram below shows how the location chosen for the primary food center meets the previously described criteria.

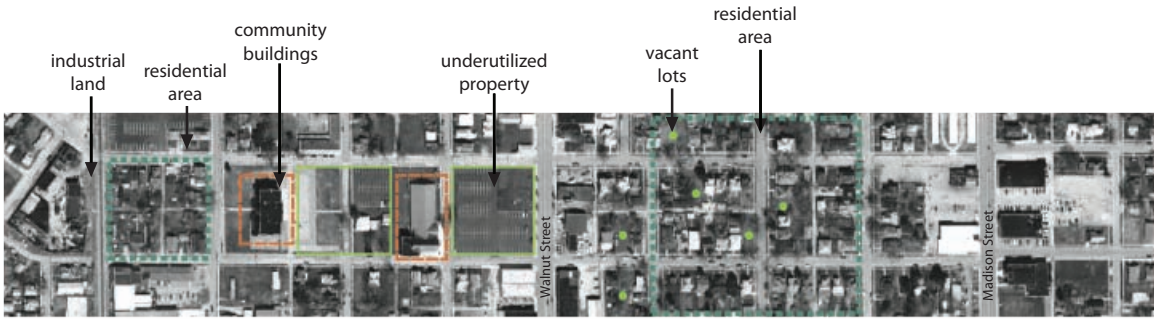


Figure 5.4 Site selection criteria

Types of interventions

Seven types of design interventions will be applied in this area and serve as examples for a prototypical food center location and the immediate surroundings. Each of these interventions explores agricultural productivity in a unique manner and at a variety of scales. Interventions will address the design of the community food center, creating a network between spaces, or individual parcels of land. The seven types of interventions are:

1. A community park: space for the community to gather and utilize for their social and recreational needs
2. Commercial center: contains the space needed for food processing and distribution, and sale and a small café
3. Pedestrian connections: networks of greenways, sidewalks, and pedestrian priority streets create linkages between the commercial center and the residential areas

4. Industrial “leftover” space: finding productive uses for small remnants of land throughout the community
5. Collections of lots: treating adjacent vacant properties as a single entity and exploring their productive potential
6. Edible alleys: provide semi-private spaces for residents to create food as well as generate resources
7. Residential permaculture: suggested methods for transforming lawns into productive spaces

Design Development

Plant Material

By defining guilds that are appropriate for the climate in Muncie, Indiana as well as for their intended location within the site, a series of plants have been chosen. These guilds will then be arranged in a manner that is mutually beneficial to the surrounding guilds and the planting scheme will grow in this manner. This table shows the plants that have been chosen for installation on this site. The beneficial functions of each plant are also identified. Some serve as nutrient accumulators or nitrogen fixers and other attract beneficial animals and insects or provide the needed habitat.

Each guild also has one central element that typically produces edible fruits. The other plants in the guild serve in supporting roles to this central plant. Some of these supporting plants are edible while others’ roles are to provide other necessary functions in order for the central plant to thrive.

Central element	Insect/bird attractor	Nutrient accumulator	Nitrogen fixer	Grass suppressor	Additional plants
Pawpaw: Asimina trilobata	Black currant: Ribes nigrum	Globe artichoke: Cynara scolymus	Yarrow: Achillea millefolium	Strawberry: Fragraia spp.	Squash: curcurbita
Persimmon: Diospyros virginiana	Goumi: Eleagnus multiflora	Carrots: Daucus carota	Buffaloberry: Shepherdea argentea	Wild ginger: Asarum canadense	Runner bean: Phaseolus coccineus
Black Locust: Robinia pseudoacacia	Musk mallow: Malva moschata	Comfrey: Symphytum officinale	None	Creepying thyme: Thymus praecox	Grape: Vitis spp.
Apple: Malus sylvestris	Clematis: Clematis spp.	Fennel: Foeniculum vulgare	Clover: Trifolium spp.	Camas: Camassia quamash	Manchurian Bush Apricot
White mulberry: Morus alba	Fennel: Foeniculum vulgare	Garlic chives: Allium tuberosum	Buffaloberry: Shepherdea argentea	Thrift: Phlox subulata	Blueberry
Mazzard cherry: Prunus avium	Chamomile: Chamaemelum nobile	Carrots: Daucus carota	Clover: Trifolium spp.	Sweet violet: Viola ordata	
Plum: Prunus domestica	Perennial buckwheat: Fagopyrum dibotrys	Spearmint: Mentha spicata	Alfalfa: Medicago sativa	Wild ginger: Asarum canadense	
Almond: Prunus dulcis	Red raspberry: Rubus idaeus	Chicory: Chicorium intybus	Blue false indigo: Baptisia australis	Strawberry: Fragraria spp.	Columbine
Sweet chestnut: Castanea sativa	Russian sage: Perovskia atriplicifolia	Chives: Allium schoenoprasum	Pea: Pisum sativum	Licorice fern: Polypodium glycyrrhiza	
Ponderosa Pine: Pinus ponderosa	Red raspberry: Rubus idaeus	Comfrey: Symphytum officinale	Blue false indigo: Baptisia australis	Licorice fern: Polypodium glycyrrhiza	
Sugar Maple: Acer saccharium	Hops: Humulus lupulus	Lemon balm: Melissa oficinalis	Pea: Pisum sativum	Creeping Thyme: Thymus praecox	
Honey Locust: Gleditsia triacanthos	Chokeberry: Aronia melanocarpa	Chives: Allium schoenoprasum	None	Strawberry: Fragraia spp.	

○ some part of the plant is edible

● plant is entirely inedible but serves another important function in the guild

Figure 5.5 Examples of permaculture guilds appropriate for Muncie, Indiana

Master Plan

The master plan for the South-Central community food center includes seven interventions as previously discussed: A community park, alleys, industrial space, residential property, commercial core, and creating pedestrian connections.

Commercial Core

It was very important when conceptualizing the commercial core of the community food center to utilize existing structures that are currently empty or underutilized. Several buildings were chosen as the location for food processing, distribution, a small café, an indoor market, and an indoor growing facility are located

along Walnut Street between the intersections of 6th Street and 7th Street.

Figure 5.6 Location of commercial core

The commercial core serves as the hub for the neighborhood's food production, processing, distribution, and sales. It includes indoor spaces for each of these functions as well as visual connections to help understand the path food travels from growth to consumption. Food produced throughout the rest of the community is brought to this area to undergo any needed processes before it is ready for consumption. Then it is either sold or taken to the café.

Figure 5.7 Master plan of commercial area in the community food center

Community Gathering Space

The community park serves as the main gathering space for residents. Providing places for the community to gather is an important aspect of the success of this intervention. In this particular design, a large tract of land (that is currently used as a parking lot) is transformed into a large park space. Permaculture plantings make up a

large part of the space and serve as additional productive land that can be farmed as well as create a multi-sensory experience as you explore. Plots along the south edge of the park provide space for community gardens. In addition to the edible plantings, a large open lawn area is provided for recreational activities. A plaza along Walnut Street also provides space for community activities.

Figure 5.8 Existing site conditions

Figure 5.9 Park masterplan

Energy harvesting is also an important component in permaculture. For this reason, rainwater collection takes place throughout the site. Water is captured in cisterns from the rooftops of the two storage facilities. Runoff from pavement is also captured in a small runnel that runs much of the length of the site from north to south. Water in this runnel feeds underground storage tanks. Water is held in these tanks and used whenever supplemental water is needed.

Solar panels are also placed on the roof of each of the storage buildings and that electricity is used to power lights throughout the site. An overhead structure over the plaza holds several solar panels that also contribute to the power supply.

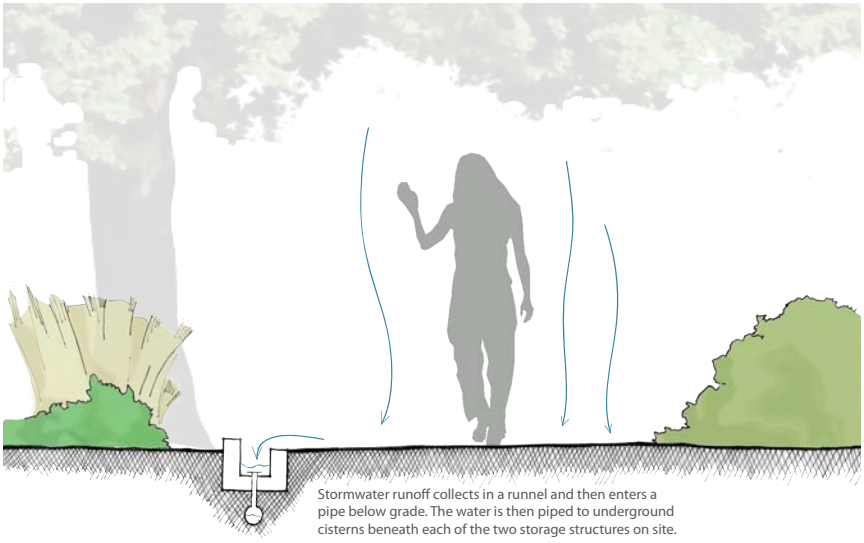


Figure 5.10 Runnel diagram

The streets adjacent to the park space are planted with permaculture plantings that are appropriate for the high level of vehicular and pedestrian traffic this area will receive. The walkways are generous in their dimensions to accommodate pedestrian traffic for special events and group activities. A three-foot landing is provided on the street side of the plantings for pedestrians stepping out of cars or crossing the street.

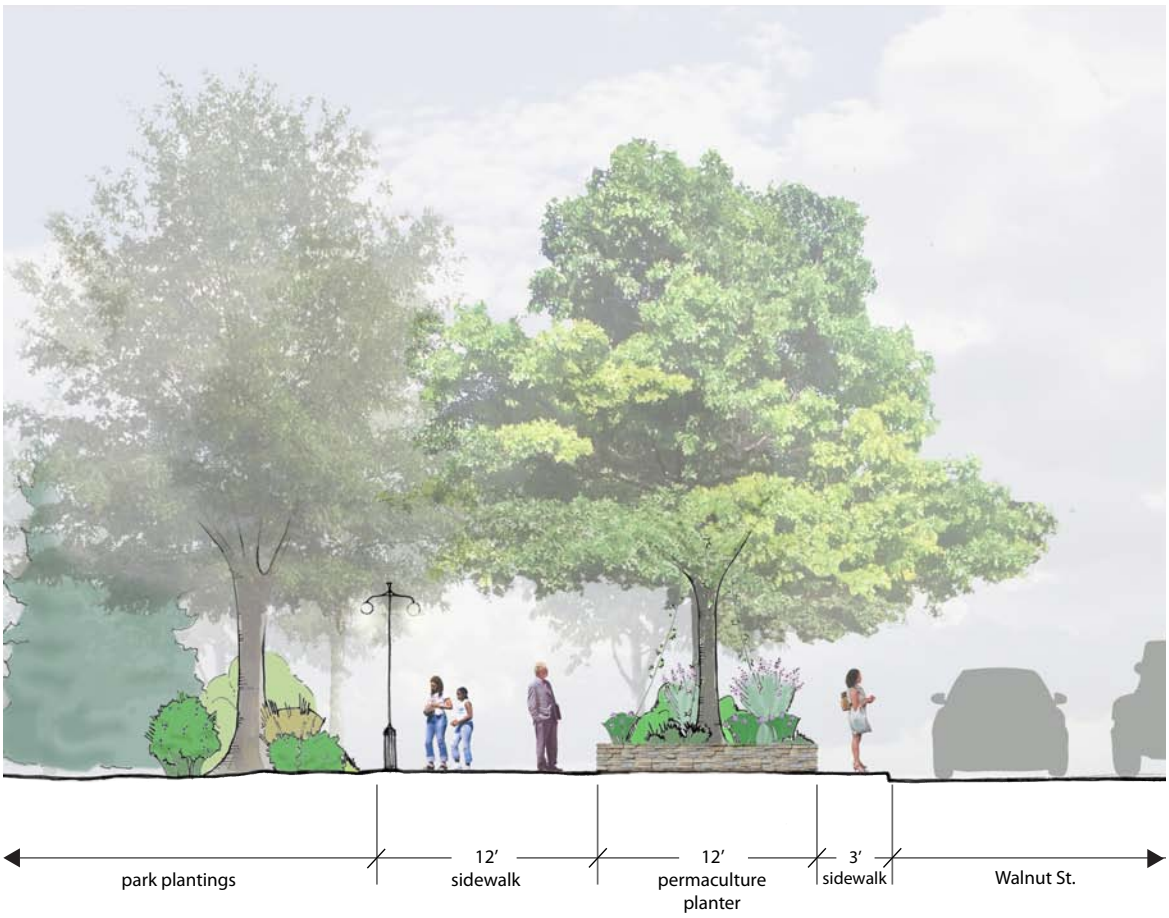


Figure 5.11 Street planting section

The plants chosen for this particular setting are based around the Sugar Maple as the central guild element and include hops, blueberries, chives, Russian Sage, and spearmint. These are examples of fairly low maintenance plants that create minimal litter on adjacent walkways.

Figure 5.12 Permaculture guild used for a typical street planting

Small picnic spaces are provided throughout the park's permaculture plantings for small groups to gather. Below is a section of what one of this spaces will look like.

Figure 5.13 Section cut through a typical picnic area in the park

Pedestrian Access

Creating a better network of pedestrian access throughout the site that links community gathering spaces and commercial areas with the residential areas is greatly important in order to foster a commitment to a healthier lifestyle. In order to create a better pedestrian network, three strategies are implemented. First, underutilized streets are removed and transformed into pedestrian greenways that also serve as additional agriculturally productive space. Alleys that have the potential to link important destinations are identified and retrofitted to better serve as pedestrian thoroughfares. Streetscapes are improved to include permaculture plantings that help create a stronger community identity as well as contribute to the food production in the community. Each of these interventions uses permaculture as a guide for plant selection and design.

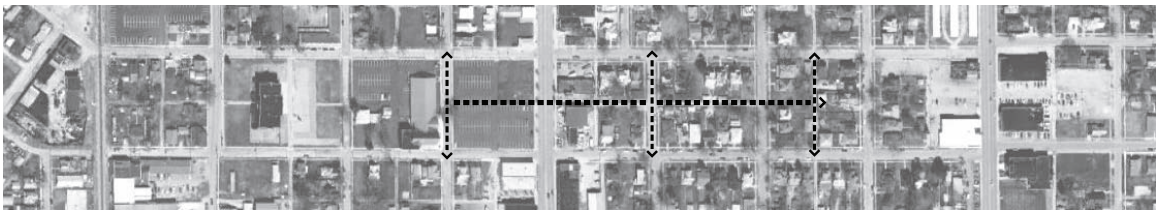


Figure 5.14 Primary pedestrian connections throughout the site

Pedestrian Streets

Those streets previously identified as underutilized or unnecessary are removed to make way for pedestrian only thoroughfares. These spaces provide the same connections the streets did, but give priority to the pedestrian rather than the car. They also minimize the amount of paving needed and fill the remaining space with permaculture plantings.

Figure 5.15 Section through a pedestrian street

Greenways

A new greenway is implemented between the proposed public outreach center and the proposed market. This greenway provides a pedestrian only linkage between the commercial area, park and the residential areas. The areas adjacent to the primary walkway are planted with additional permaculture plantings in order to maximize productive space whenever possible.

Figure 5.16 Existing conditions at the site of a proposed greenway

Figure 5.17 Orientation of greenway view

Figure 5.18 View of proposed greenway between the public outreach center and local market

A living crosswalk connects the greenway to the park across Walnut Street. Live plant material provides a visual connection across the pavement. A steel grate provides the driving surface for cars to cross over while still providing the visual linkage between the two spaces.

The plants are grown in trays so they are easily removable and can be cleaned. Storm water infiltrates through the plant material into a storm water collection system below.

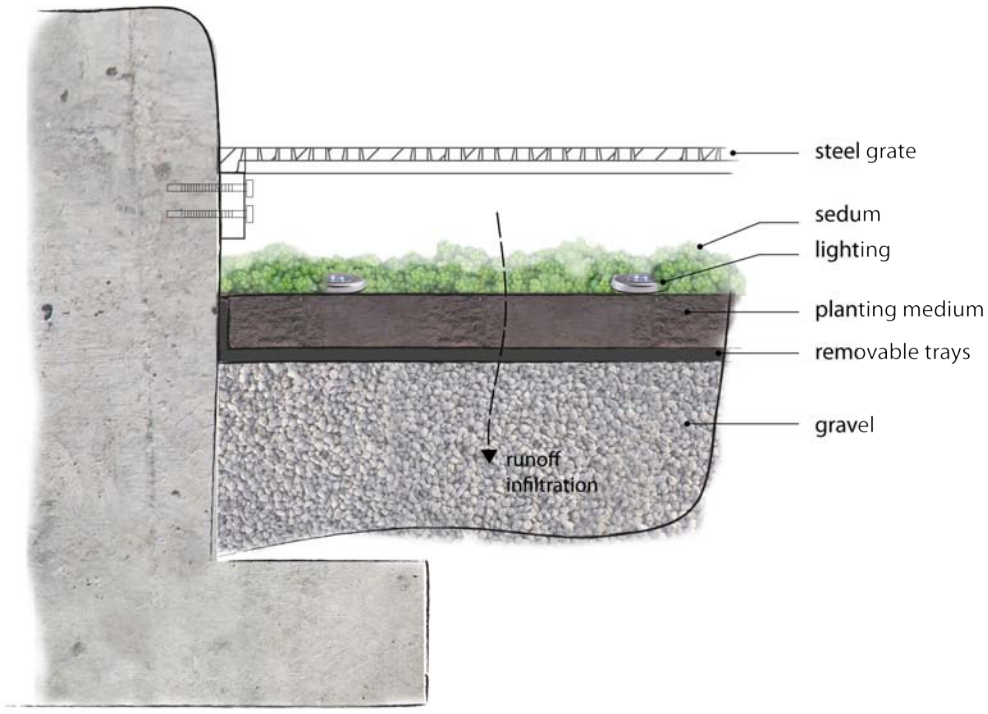


Figure 5.19 Section of living crosswalk across Walnut Street

Collections of Lots

On blocks where several adjacent vacant lots are present, homeowners on that block would have the opportunity to purchase lots neighboring their own property at a minimal cost. If a grouping of lots is not purchased, they will become part of the public domain and can be farmed as a single unit.

Those plants most frequently harvested will be located nearest to the existing street or alley for easy accessibility. These areas are designated as zone one in the diagram that follows. Plantings in zone two are those that require harvest or maintenance on a

fairly regular basis and those that need the littlest amount of attention are located in zone three.

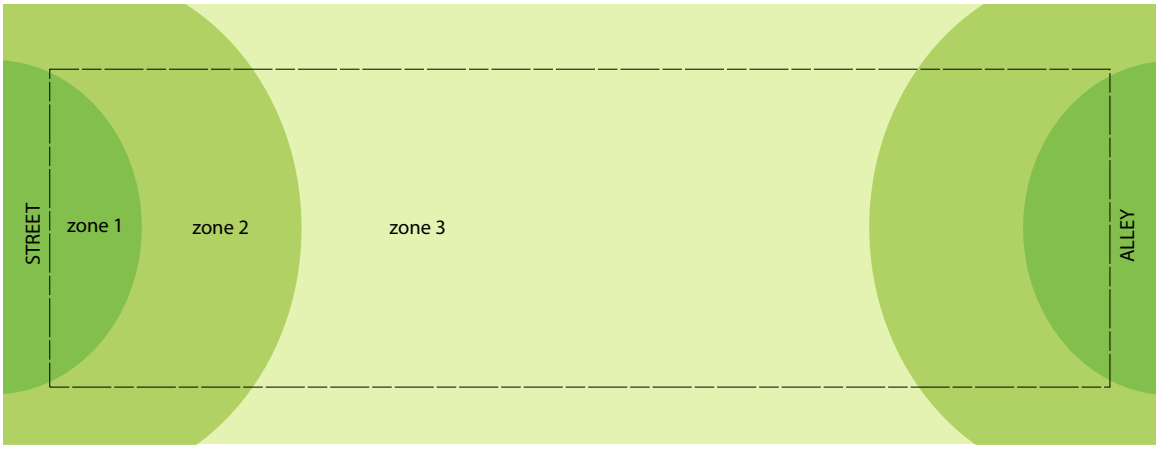
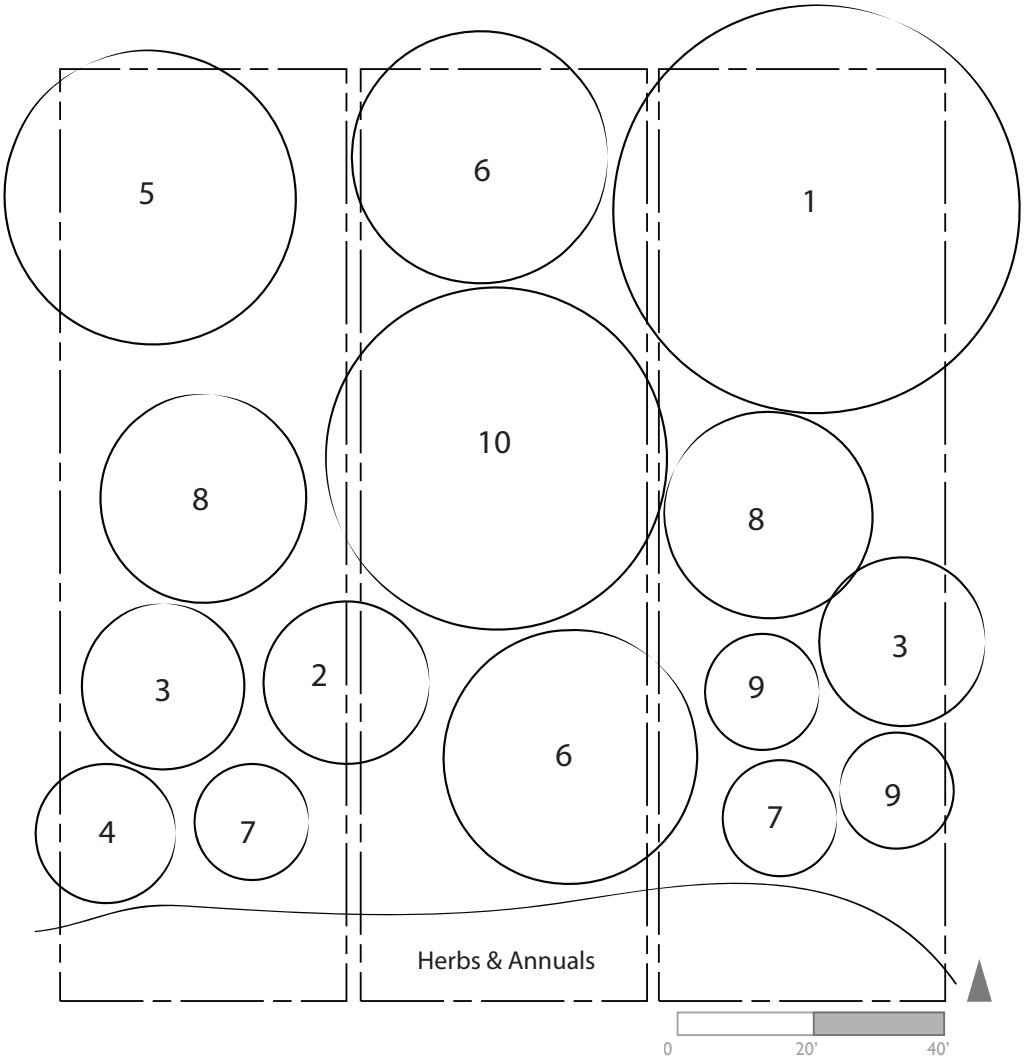


Figure 5.20 Planting zones for a typical vacant lot

The planting plan must also take into consideration the relationship to the sun. Smaller trees and plants will be located on the south end of the property and become increasingly taller as they approach the north end of the site in order to maximize sun exposure. Below is an example of a typical treatment for a collection of lots. This particular example illustrates a planting plan for three adjacent lots.



1. Sugar Maple
Lemon Balm
Creeping Thyme
Black Currant

2. Persimmon
Goumi
Carrots
Buffaloberry
Wild ginger

3. Almond Tree
Comfrey
Red raspberries
Blue False Indigo
Clematis

4. Paw Paw
Black currant
Glober artichoke
Yarrow
Strawberry

5. Walnut
Elderberry
Woflberry
Mulberry
Currant

6. Black Locust
Musk Mallow
Comfrey
Creeping thyme

7. Mazzard Cherry
Chamomile
Carrots
Clover
Sweet Violet

8. White Mulberry
Fennel
Garlic Chives
Buffaloberry
Thrift

9. Plum Tree
Licorice Fern
Perennial Buckwheat
Wild Ginger
Spearmint
Strawberries

10. Honey Locust
Chockeberry
Chives
Strawberry

Figure 5.21 Planting plan for a typical collection of lots

Edible Alleyways

Many of the alleys throughout the community are also highly underutilized and in dire need of repair. They hold great potential to become an additional location for food production and harvesting of additional resources, like water. Vehicular access would still be provided, but priority would be giving to the pedestrian and residents from adjacent lots utilizing resources now available in this space.

Figure 5.22 Section through proposed alley retrofit

Figure 5.23 Permaculture plantings for a typical alley

Industrial spaces

In this particular site, space along the existing rail lines could be used for production on non-edible plants and products that have the potential to provide income such as Christmas trees, apiaries, and flowers to be sold at markets. Because of the dangerous nature of this particular industrial land type, the uses for this area would be limited to those working for the governing agency as opposed to being open for general public use.

Figure 5.24 Proposed uses for the area adjacent to existing railroad tracks include non-edibles such as flowers, evergreen trees, and apiaries

Figure 5.25 Existing conditions along railroad tracks

Residential Food Production

A typical lot in this neighborhood is forty-five feet wide and ranges from 120 to 150 feet in length. These drawings demonstrate the productive potential of a single lot. The plants were chosen and arranged based upon their assigned guilds as well as their location relative to the amount of sun each part of the lot receives and also their proximity to the house. Plants that are accessed most frequently are located closest to the house in zone one and those needed less often or that require only a single yearly harvest are in the zone farthest from the house that could also include the alleyways.

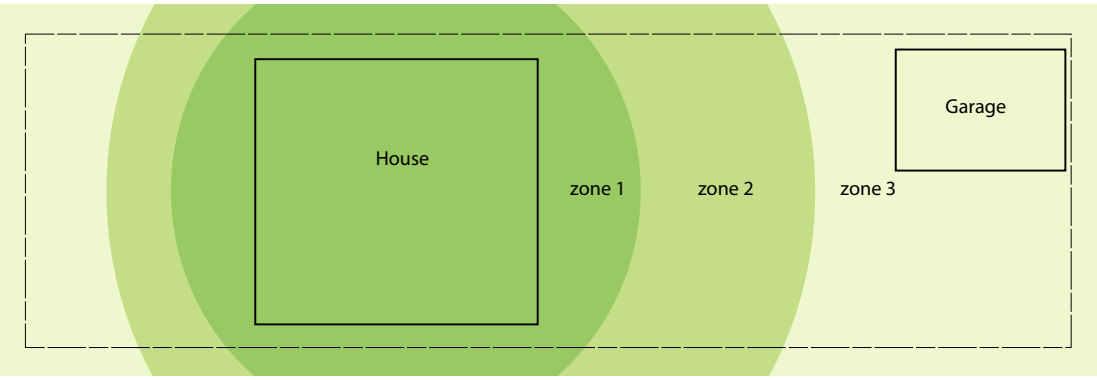


Figure 5.26 Residential planting zones diagram

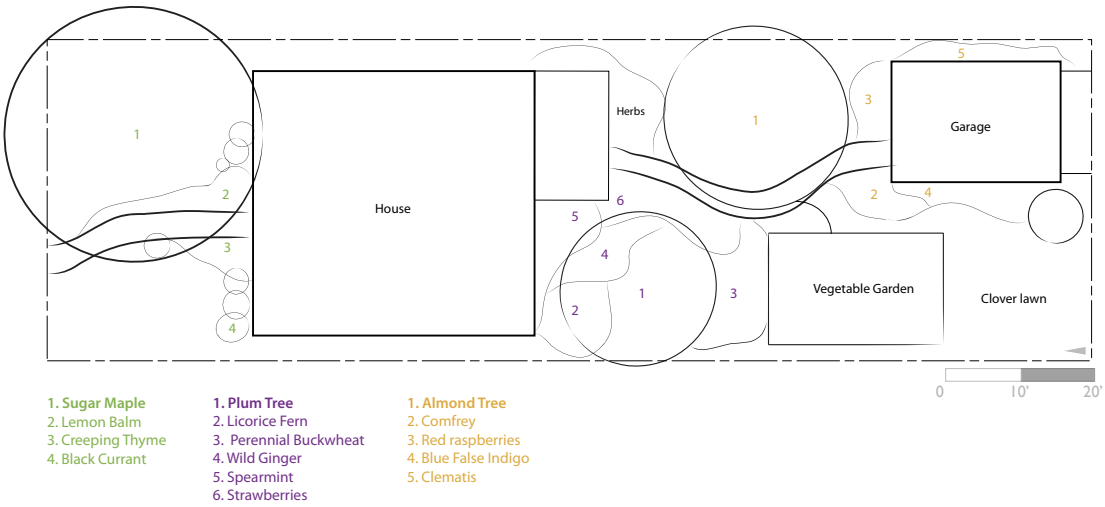


Figure 5.27 Prototype for a residential permaculture-planting scheme

Important Processes

Composting

Prior to any planting many of the soils are likely to need remediation in order to build soil as well as a nutrient supply to support productivity. In order to do so, sheet-mulching (or sheet composting) techniques will be utilized. Sheet mulching is done mostly in place and is appropriate for many of the larger areas that would otherwise require creating, transporting and spreading very large amounts of compost. First, existing, unwanted vegetation would be mown or cut down, left in place, and covered with a weed suppressing material such as cardboard, newspaper or wool. A thin layer of manure will be added next and followed by eight to twelve inches of organic matter such as spoiled alfalfa hay, straw, or leaves (Hemenway 86-87).

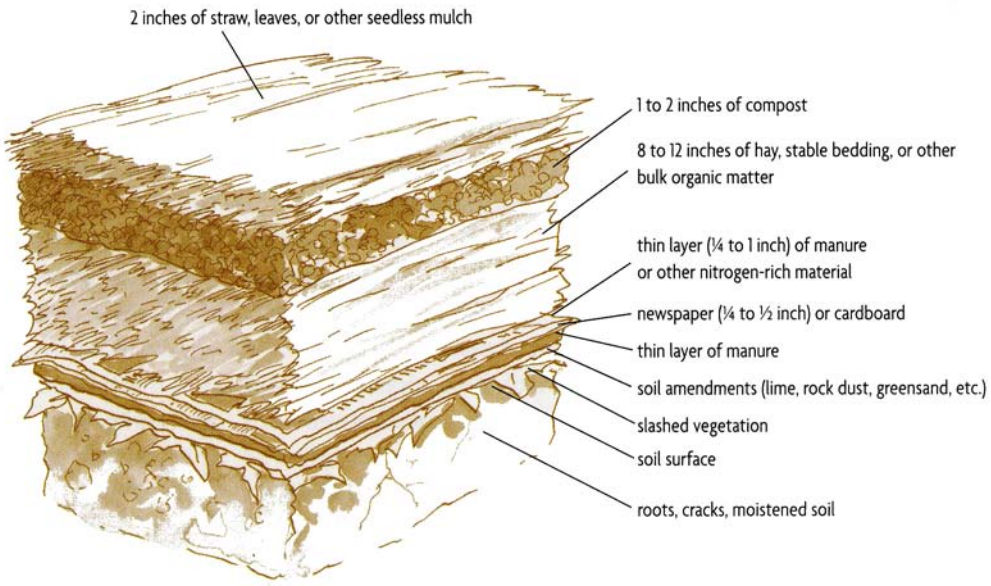


Figure 5.28 Composition of typical sheet mulch

This type of composting is very inexpensive and almost any organic material from the bioregion will suffice as long as large quantities are available. Bark, sawdust, chipped tree trimmings, agricultural byproducts such as straw and grain hulls, organic waste from food processors, and even leaves are all commonly used in sheet mulching (Hemenway 86). Companies happy to be rid of their waste products are also typically willing to donate many of these materials.

Several months to a year before the first installation of plants are set, every area where new plantings are specified will be thoroughly sheet mulched. Over winter, the organic materials will break down and start to become humus. The weed suppressing membrane will also break down enough by spring for seedlings to be able to penetrate (Hemenway 86).

After the plants are established, mulching will take place in the late fall once a year. Leaves and other available organic materials such as alfalfa grass, food byproducts and chipped tree trimmings will be collected from community residents and stored at a central location. They will then be spread in the late fall before the onset of winter.

Not only will this method of soil remediation be best suited for the sites described throughout this design, but it also allows for community involvement in the gathering and distributing of organic materials. The diagram below shows the process by which organic materials are collected, stored, and then redistributed.

Figure 5.29 Collection, storage, and redistribution of compost materials

Planting

Plants in each of the guilds should not be installed at the same time. It is important that the plantings are very systematically installed and that some plants have the opportunity to establish themselves before others are introduced into the ecosystem.

Productive Potential

As previously stated, approximately seventy-five percent of the land on this 220 acre site is potentially available for agricultural production. This includes all residential property as well as industrial, vacant, or underutilized land that may or may not require soil remediation before any planting can take place. The 165 acres of available land could potentially provide the community population of 3,673 people with eighteen percent of their yearly vegetarian food requirements, which is based on the premises that one quarter acre of land can provide a year's worth of food needs to a single person consuming a primarily vegetarian diet (Peters).

The amount of food that could potentially be produced within the community could be increased if indoor production, aquaponic systems, vertical gardening, and green roofs are introduced throughout the area.

Multiple growing seasons are important to increasing food availability and maintaining year-round production. The diagram below shows planting and harvest dates for commonly planted vegetables for the Muncie area. Most plants have two possible growing seasons. Spring planting and harvest is identified in green and the fall season is shown in purple. For several plants with short growing seasons, it is also possible to continually plant between the spring planting and the last possible planting date, which is represented by the start of the fall season.

It is important to recognize that these dates are approximations and they may change year to year depending upon recent weather patterns. There are also many

cultivars for the individual species listed in the diagram. These cultivars often have varying growing seasons and it is important to use the harvest date identified for the individual cultivar if it differs from the date identified below.

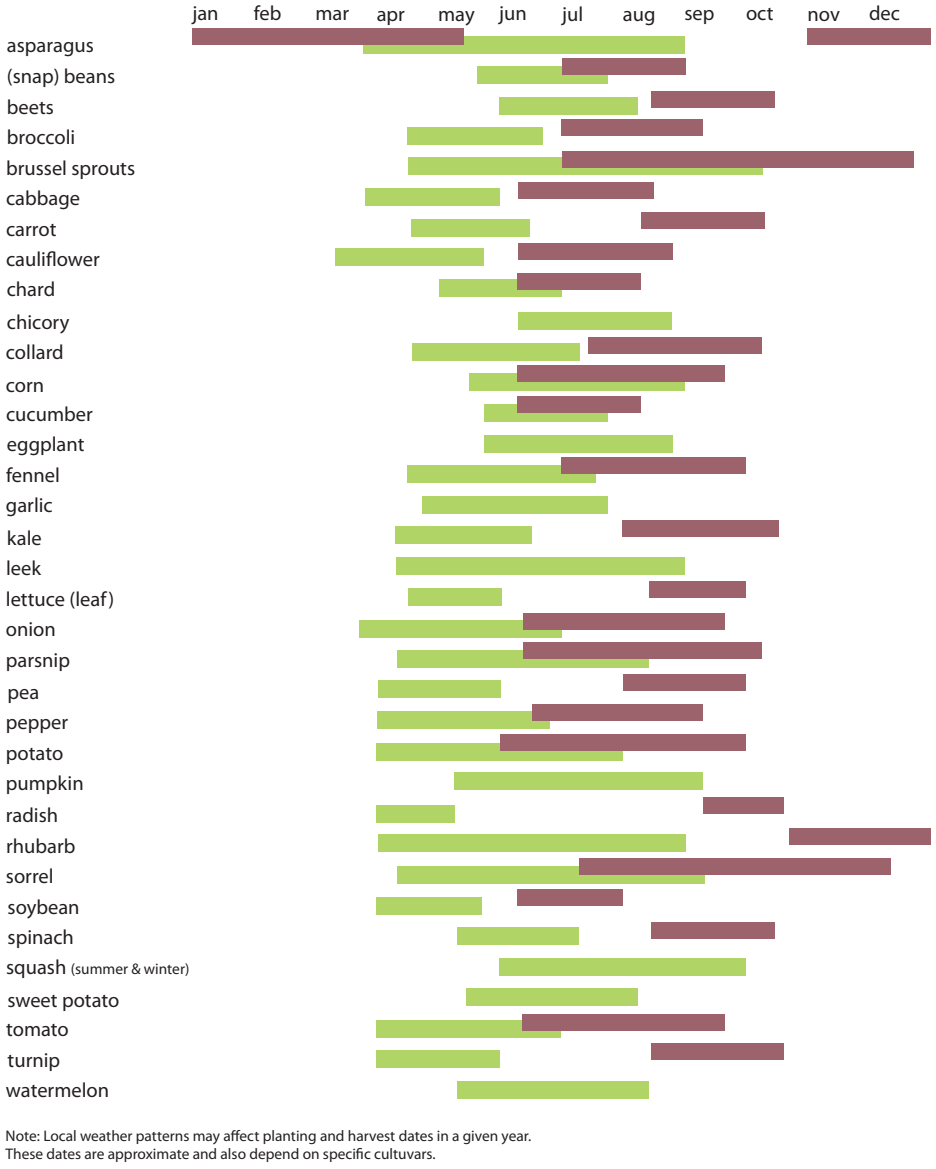


Figure 5.30 Growing seasons for commonly planted produce

Organizational Structure

Infrastructure of all types including streets, alleys, and sidewalks will still be maintained by the city of Muncie. But, the added plantings will likely require a governing organization of trained employees and volunteers in order to properly care for the permaculture plant installations.

The formation of a non-profit organization to oversee care of the plants throughout the growing season and coordinate their harvest is the most likely scenario. Large numbers of volunteers will also be required in order to maintain plant material, generate, and distribute the large amounts of compost needed throughout the site, as well as any number of other necessary tasks.

Several paid positions would become available within each participating neighborhood as well. The diagram below describes six paid positions within each community. With additional funding, more positions could be created to employ additional community members. These positions describe the minimal essentials in order to effectively coordinate all of the efforts needed to make this endeavor a success.

Governing Board	Muncie Board of Directors 1. distribution of funding 2. monitor and work to strenghen individual neighborhood programs
Neighborhood leadership	South-Central president (an elected position) 1. overseeing all areas 2. coordinating crop sharing with other neighborhoods 3. monitoring anything not described in the roles of supporting staff 4. all hiring of additional staff
Specialists	Land manager 1. overseeing year round indoor and outdoor agricultural production 2. production of compost 3. ensuring safety of growing conditions Volunteer coordinator 1. coordinate all volunteer labor 2. run work release/job training programs Public outreach specialist 1. planning and running public workshops and tours 2. marketing 3. planning community events Food processing/Distribution 1. oversee small staff responsible for all processing and packaging necessary 2. coordinate delivery of goods with other neighborhoods 3. ensure safety of all food products Financial specialist 1. securing funding 2. managing accounts 3. managing voucher system

Figure 5.31 Suggested governing structure to oversee agricultural production

Management of Production at Three Scales

Agricultural production will occur at three varying scales. The smallest scale includes spaces such as individual residential lots and single vacant lots. Mid-size spaces such as collections of lots or parcels of industrial land fall into the second tier. The largest scale consists of street plantings, parks, and those areas that are part of a network of pedestrian connections throughout the community.

These three scales of production inform the type of management that will be required in order to maintain them. An individual will be appointed as the neighborhood

land manager and will be in charge of maintaining all of the areas that fall into both mid-size and large-scale production. This individual maintains all street plantings, park spaces, and public rights of way, etc. Small-scale spaces will most likely be private property and property owners will have the option to privately manage these spaces or participate in a larger system of production by leasing their property to the community to be farmed by the land manager.

A voucher system would be put in place for those who opt to lease their private property to the community to be cultivated. Residents who chose this option will be compensated in the form of vouchers that they can redeem for produce at the local market.

If a person who is privately farming their own land produces more of a particular crop than they need, they also have the option of taking what they do not need to the local market in exchange for a voucher. The amount of the voucher is based upon the value of the type of crop being exchanged and the amount they wish to trade. This voucher allows this person to purchase other types of food being produced throughout the community in the local market.

All food produced on land that is managed by the farmer is sent to the food center for processing and distribution and then sold to community members. When the growing season nears its end for individual crops, people will be invited to glean the areas and take any remaining produce. This not only helps the community members who are in need of food, but will also help maintain these areas.

Volunteer Labor and Job Training

Community members of all ages will be encouraged to participate in tasks related to agricultural production, working in the market, or any other area whenever they are able. Volunteers will be compensated with vouchers for produce that can be purchased at any of the local market within the community. The amount of the voucher will be based upon the amount of time an individual has spent volunteering their time but is intended to assist those who are unemployed in defraying the cost of food.

Job training programs will also be put in place that target out of work residents and ex-offenders of non-violent crimes who are struggling to find work. The programs will teach participants the skills necessary to grow food and participate in the harvest of foods throughout the community. After completing a job-training program, participants are encouraged to apply for any available positions.

Chapter 6

Conclusions and Recommendations

The goal of the interventions discussed in this book are not to immediately supply the community with the whole of their food needs, but rather to begin to create a culture of food production where the community can feel more in control of their food choices. Allowing residents to participate in food production will also provide an educational opportunity to better understand how food makes its way from farm to table.

These interventions also create an opportunity to reinvest in infrastructure that is greatly in need of repair. These upgrades and retrofits when paired with permaculture have the potential to beautify many places within the community.

Opportunities for economic gain are also built into these interventions and ideally the added income to the community would help offset the income of families struggling to provide for their household.

EXPANDED SCOPE

This project was designed with a limited scope in order to make it manageable in the time frame allotted. If the project were to be taken further, there are several other areas that can and should be addressed.

- Plants produce at various times throughout the year. Sequencing this productivity to ensure production is a year-round endeavor is very important to determining how well the community could support their food needs without outside support.
- The introduction of small livestock (chickens, goats, etc.) in areas specifically designed for them could provide another source of food as well as benefit the cyclical nature of permaculture.
- Master planning throughout the entire city to create community food centers in all neighborhoods and design elements to link these centers and the communities to one another.
- Engaging the community in design decisions and revising the design based upon their feedback would make this proposal even stronger and ensure its authenticity to the community.

THE FUTURE

The proposed design could potentially serve as a catalyst for change that would bleed into the rest of the communities in Muncie. This particular neighborhood could serve as a model for other communities throughout the city as well as other Rust Belt cities throughout the country experiencing similar problems as Muncie. Adding one

more layer by identifying specializations within each community and arranging an exchange of goods between communities could provide a greater percentage of one's food needs and also provide additional income to these communities.

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Appendices

Muncie Plant List

Permaculture plant list for Muncie, IN

Common Name	Botanical Name	Hardy to zone	Type	Light	Edible Part	Animal Use	Other Uses	Comments
Tall Trees, 50 ft. and larger								
Beech	Fagus spp.	5	Dec. tree	S/PS	seed, leaf	habitat, forage	windbreak, hedgerow	
Black locust	Robinia pseudoacacia	3	Dec. tree	Sun	flower, seed	insects, chx forage	wbr, hedgerow, wood	
Black walnut	Julgans nigra	4	Dec. tree	Sun	seed	habitat, forage	wbr, wood	medicinal
Honey locust	Gleditsia triacanthos	3	Dec. tree	Sun	seedpod	insects, habitat, chx, forage	soil stablilizer	
Lumber pine	Pinus flexilis	3	Evgrn. tree	Sun	seed	habitat, forage	windbreak, hedgerow, wood	
Oak	Quercus spp.	4	Evgrn. Tree	Sun	seed	habitat, forage, chx	wbr, hedgerow, wood	
Pignut hickory	Carya glabra	4	Dec. tree	S/PS	seed, sap	habitat, forage	hedgerow, wood	
Ponderosa pine	Pinus ponderosa	4	Evgrn. Tree	Sun	seed	habitat, forage	wbr, hedgerow, dye, wood	
Shagbark hickory	Carya ovata	4	Dec. tree	sun	seed, sap	habitat, chx, forage	wood, soil stabilizer	
Shellbark hickory	Carya laciniosa	6	Dec. tree	S/PS	seed, sap	insect, habitat, chx, forage	wood	
Sour cherry	Prunus cerasus	3	Dec. tree	Sun	fruit, tea	insect, habitat, forage	wbr, hedgerow	
Sugar maple	Acer saccharum	3	Dec. tree	S/PS	sap	insect, habitat, forage	wood	other maples good for syrup
Sweet chestnut	Castanea sativa	5	Dec. tree	Sun	seed	insect, habitat, chx, forage	wbr, hedgerow, wood	medicinal
Yellow buckeye	Aesculus flava	3	Dec. tree	S/PS	seed, sap	insect, habitat, forage	wood, soap	
Shrubs and Small Trees, 3-50 ft. tall								
Juneberry	Amelanchier spp.	4	Dec. shrub	Sun	fruit	insect, habitat, chx, forage	windbreak, hedgerow	
Chokeberry	Aronia melanocarpa	3	Dec. shrub	Sun/PS	fruit	insect, habitat, chx, forage	hedgerow, dye	
Giant reed	Arundo donax	6	Grass	sun	root		basket, soil stabilizer, hedgerow, wbr	
Pawpaw	Asimina trilobata	6	Dec. tree	shade/ps	fruit	habitat, chx, forage	dye, fiber	
Blue false indigo	Baptisia australis	5	Dec. shrub	sun		insect	nitrogen fixer	
Barberry	Berberis vulgaris	3	Dec. shrub	sun/ps	fruit, tea	habitat, forage	windbreak, hedgerow, dye	
Scotch heather	Calluna vulgaris	4	Evgrn. Shrub	sun	tea	insect	wbr, hedgerow, basket, dye	
Siberian pea shrub	Caragana arborescens	3	Evgrn. Shrub	sun	seed	insect, chx, forage	wbr, hedgerow, dye, soil stabilizer, nitrogen fixer	
Hackberry	Celtis spp.	4	Evgrn. Shrub	sun	fruit, seed	habitat, chx, forage	wbr, hedgerow, dye	
Bittersweet	Celastrus orbiculatus	4	Dec. shrub	sun/ps	young leaf	habitat, forage	wbr, hedgerow	leaves should be cooked
Redbud	Cercis canadensis	5	Dec. tree	sun	flower	insect, habitat	hedgerow	
Hazelnut	Corylus spp.	4	Dec. tree	sun/ps	seed, oil	habitat, forage	wbr, hedgerow, basket	
American persimmon	Diospyros virginiana	6	Dec. tree	sun/ps	fruit	habitat, forage	hedgerow	
Date plum	Diospyros lotus	5	Dec. tree	sun/ps	fruit	habitat, forage	hedgerow	
Russian olive	Elaeagnus angustifolia	2	Dec. shrub	sun	fruit	insect, habitat, chx, forage	wbr, hedgerow, nitrogen fixer	
Silverberry	Elaeagnus commutata	2	Dec. shrub	sun	fruit	insect, habitat, chx, forage	wbr, hedgerow, fiber, nitrogen fixer	
Goumi	Elaeagnus multiflora	6	Dec. tree	sun	fruit	insect, habitat, chx, forage	wbr, hedgerow, nitrogen fixer	
Autumn olive	Elaeagnus umbellata	3	Dec. tree	sun	fruit	insect, habitat, chx, forage	wbr, hedgerow, nitrogen fixer	
Elaeagnus	Elaeagnus x ebbingei	6	Evgrn. Shrub	sun/shade	fruit	insect, habitat, chx, forage	wbr, hedgerow, nitrogen fixer	
Fuchsia	Fuchsia magellanica	6	Dec. shrub	shade/ps		hummingbird	wbr, hedgerow	medicinal
Kentucky coffee tree	Gymnocladus dioica	4	Dec. tree	sun	seed pod	habitat, forage	hedgerow, soap, nitrogen fixer	
Witch hazel	Hammamelis virginiana	5	Dec. shrub	PS	seed	habitat	hedgerow	medicinal
Mallow	Hibiscus syriacus	5	Dec. shrub	sun	leaf, flower, oil tea	insect, habitat	wbr, hedgerow, fiber	
Bachelor's button	Kerria japonica	4	Dec. shrub	sun/ps	young leaf			drought tolerant
Lavender	Lavandula spp.	5	Evgrn. Shrub	sun		insect	wbr, hedgerow	medicinal
Bush clover	Lespedeza thunbergii	5	Dec. shrub	sun		insect	nitrogen fixer	
Apple	Malus sylvestris	3	Dec. tree	sun	fruit	insect, habitat, forage	hedgerow	
Medlar	Mespilus germanica	6	Dec. tree	sun	fruit	habitat		
White mulberry	Morus alba	3	Dec. three	sun	fruit, young leaf	chx, habitat, forage	wbr, hedgerow, dye, fiber	
Heavenly bamboo	Nandina domestica	6	Dec. shrub	sun/ps	shoot	habitat	wbr, hedgerow, poles, fiber	
Tupelo	Nyssa sylvatica	3	Dec. tree	sun	fruit	insect, habitat		alkaline soil
Mock orange	Philadelphus coronarius	5	Dec. shrub	sun		insect, habitat	wbr, hedgerow	
Bitter orange	Poncirus trifoliata	5	Evgrn. Shrub	sun	fruit	habitat	wbr, hedgerow	medicinal
Apricot	Prunus armeniaca	4	Dec. tree	sun	fruit	insect, habitat, forage		
Mazzard cherry	Prunus avium	5	Dec. tree	sun	fruit	insect, habitat, forage		
Plum	prunus domestica	3	Dec. tree	sun	fruit	insect, habitat, forage	wbr, hedgerow	
Almond	Prunus dulcis	3	Dec. tree	sun	seed	insect, habitat, forage	wbr, hedgerow	
Fuji cherry	Prunus incisa	6	Dec. tree	sun	fruit	insect, habitat, forage	wbr, hedgerow	
Peach/nectarine	Prunus persica	6	Dec. tree	sun	fruit	insect, habitat, forage	hedgerow	
Lemonade berry	Rhus integrifolia	3	Dec. shrub	sun/ps	fruit, flower	insect, habitat, forage	hedgerow	
Staghorn sumac	Rhus typhina	3	Dec. shrub	sun	fruit	habitat	wbr, hedgerow, dye, soil stabilizer	
Black currant	Ribes nigrum	5	Dec. shrub	sun/shade	fruit	insect, habitat, chx, forage	hedgerow	
Red currant	Ribes rubrum	5	Dec. shrub	sun/shade	fruit	insect, habitat, chx, forage	hedgerow	
Gooseberry	Ribes uva-crispa	5	Dec. shrub	sun/ps	fruit	insect, habitat, chx, forage	hedgerow	
Himalayan blackberry	Rubus discolor	5	Dec. climber	sun/ps	fruit	insect, habitat, chx, forage	hedgerow	
Red raspberry	Rubus idaeus	3	Dec. shrub	sun/ps	fruit	insect, habitat, chx, forage	hedgerow	
Black raspberry	Rubus occidentalis	4	Dec. shrub	sun/shade	fruit, tea	insect, habitat, chx, forage	hedgerow	
Purple osier	Salix purpurea	5	Dec. shrub	sun		habitat	wbr, hedgerow, basket	
Black elderberry	Sambucus nigra	5	Dec. shrub	sun/ps	fruit, flower	insect, habitat, chx, forage	wbr, hedgerow, dye	medicinal
Sassafrass	Sassafrass albidum	5	Dec. shrub	sun/ps	leaf, bark, fruit	habitat	dye	
Buffaloberry	Shepherdia argentea	2	Dec. shrub	sun	fruit	insect, habitat, chx, forage	wbr, hedgerow, dye, nitrogen fixer	drought resistant
Blueberry	Vaccinium corymbosum	2	Dec. shrub	sun/ps	fruit	insect, habitat, forage	hedgerow	acid soil
Cranberry	Viburnum trilobum	2	Evgrn shrub	sun/ps	fruit	insect, habitat, forage	hedgerow	acid soil
Herb Layer Plants								
Alfalfa	Medicago sativa	5	Herbaceous	sun	leaf, seed	insect, habitat, forage	nitrogen fixer	
Asparagus	Asparagus officinalis	4	Herbaceous	sun	stem			
Bulrush	Scirpus spp.	4	Herbaceous	sun/ps	leaf, seed, root	habitat	fiber	medicinal
Chamomille	Chamaemelum nobile	4	Herbaceous	sun/ps	tea	insect	dye	
Chicory	Cichorium intybus	3	Herbaceous	sun	flower, leaf, root	insect	nutrient	
Chinese artichoke	Stachys affinis	5	Herbaceous	sun	leaf, root			
Chives	Allium schoenoprasum	5	Herbaceous	sun/ps	flower, leaf, root	insect	nutrient	
Collards	Brassica oleracea viridis	6	Herbaceous	sun/ps	flower, leaf	habitat		
Columbine	Aquilegia vulgaris	4	Herbaceous	sun	flower, tea	insect		
Comfrey	Symphytum officinale	5	Herbaceous	sun/ps	leaf	insect, chx	nutrient, biomass	medicinal
Creeping thyme	Thymus serpyllum	5	Evgrn. Shrub	sun	leaf, tea	insect	repellent	medicinal
Daylily	Hemerocallis fulva	4	Herbaceous	sun/ps	flower, leaf, root	hummingbird	fiber	
Fennel	Foeniculum vulgare	5	Herbaceous	sun/ps	leaf, seed, root	insect, habitat, chx	nutrient	
Garlic	Allium sativum	5	Herbaceous	sun	flower, leaf, root		nutrient	
Garlic chives	Allium tuberosum	5	Herbaceous	sun/ps	flower, leaf, root		nutrient	
Globe artichoke	Cynara scolymus	6	Herbaceous	sun	flower, leaf	insect, chx		
Greek oregano	Origanum vulgare hirtum	5	Herbaceous	sun/ps	leaf, seasoning	insect		
Jerusalem artichoke	Helianthus tuberosus	4	Herbaceous	sun/ps	root	insect, habitat	hedgerow, biomass	
Kale, curly	Brassica oleracea	6	Herbaceous	sun/ps	flower, leaf	habitat		
Musk mallow	Malva moschata	3	Herbaceous	sun/ps	flower, leaf, seed	insect	fiber	
peppermint	Mentha x piperita vulgaris	3	Herbaceous	shade, ps	leaf, tea	insect		
Perennial buckwheat	Fagopyrum dibotrys	5	Herbaceous	sun/ps	leaf, seed	insect, habitat, chx		
Rhubarb	Rheum rhabarbarum	3	Herbaceous	sun/ps	stem			
Russian sage	Perovskia atriplicifolia	6	Evgrn. Shrub	sun	leaf	insect, hummingbird	wbr, hedgerow	
Spearmint	Mentha spicata	3	Herbaceous	shade, ps	leaf, tea	insect		

Stinging nettle	Urtica dioica	6	Herbaceous	sun/ps	leaf		nutrient, dye, fiber, biomass	
Stonecrop	Sedum spp.	5	Herbaceous	sun/ps	leaf			medicinal
Strawberry	Fragaria spp.	3	Herbaceous	sum/ps	fruit, leaf	insect	nutrient	
Sweet flag	Acorus calamus	3	Herbaceous	sun/ps	leaf, root		fiber	
Sweet violet	Viola odorata	5	Herbaceous	sun/ps	leaf, flower	insect		
Tarragon	Artemisia dracunculus	6	Herbaceous	sun/shade	leaf (seasoning)	insect		
Thrift	Phlox subulata	4	Herbaceous	sun/ps		insect	groundcover	
Trailing bellflower	Campanula poscharskyana	3	Herbaceous	sun/ps	flower, leaf	insect, forage		
Wild ginger	Asarum caudatum	2	Herbaceous	sun	seasoning			
Winter savory	Satureia montana	6	Evgrn. Shrub	sun	leaf	insect		
Yarrow	Achillea millefolium	2	Herbaceous	sun	leaf, tea	insect	nutrient, dye	medicinal
Carrots								
Lemon balm								
Mint	Mentha							

Vines and Climbing Plants

Akebia	Akebia quinata	5	Dec. Climber	sun/ps	fruit		basket	
Clematis	Clematis spp.	5	Dec. Climber	sun/ps		insect		
Grape	Vitis vinifera	6	Dec. Climber	sun	fruit, leaf	habitat, food	dye	
Hardy kiwi	Actinidia arguta	4	Dec. Climber	sun	fruit			
Hops	Humulus lupulus	5	Dec. Climber	sun	flower, leaf	insect, habitat	fiber, dye	medicinal
Jasmine	Jasminum officinale	6	Dec. Climber	sun/ps	flower	insect, habitat	fragrance	
Maypop	Passiflora incarnata	6	Evgrn. Climber	sun	fruit, flower, leaf	insect		medicinal
Pea	Pisum sativum	Annual	Ann. Climber	sun	fruit, flower	insect	nitrogen fixer	
Perennial pea	Lathyrus latifolius	6	Dec. Climber	sun/ps	young leaf	insect	nitrogen fixer	
Wisteria	Wisteria floribunda	6	Dec. Climber	sun		insect	basket, nitrogen fixer	

Water plants

Indian water lotus	Nelumbo nucifera	5	Herbaceous	sun	flower, leaf, root			
Tuberous water lily	Nymphaea tuberosa	5	Herbaceous	sun	root, seed			
Water chestnut	Trapa natans	5	Herbaceous	sun	seed			
Watercress	Nasturtium officinale	6	Herbaceous	sun/shade	leaf, seed	insect	nutrient	

Demographic Profile for Delaware County Census tracts 3 and 4

U.S. Census Bureau

AMERICAN FactFinder

DP-1 | Profile of General Population and Housing Characteristics: 2010

2010 Demographic Profile Data

NOTE: For more information on confidentiality protection, nonsampling error, and definitions, see http://www.census.gov/prod/cen2010/doc/dpsf.pdf.

Geography: Census Tract 3, Delaware County, Indiana

Subject	Number	Percent
SEX AND AGE		
Total population	1,606	100.0
Under 5 years	134	8.3
5 to 9 years	123	7.7
10 to 14 years	130	8.1
15 to 19 years	132	8.2
20 to 24 years	110	6.8
25 to 29 years	95	5.9
30 to 34 years	73	4.5
35 to 39 years	95	5.9
40 to 44 years	104	6.5
45 to 49 years	113	7.0
50 to 54 years	123	7.7
55 to 59 years	83	5.2
60 to 64 years	86	5.4
65 to 69 years	81	5.0
70 to 74 years	38	2.4
75 to 79 years	37	2.3
80 to 84 years	22	1.4
85 years and over	27	1.7
Median age (years)	35.2	(X)
16 years and over	1,193	74.3
18 years and over	1,138	70.9
21 years and over	1,060	66.0
62 years and over	250	15.6
65 years and over	205	12.8
Male population	733	45.6
Under 5 years	63	3.9
5 to 9 years	65	4.0
10 to 14 years	64	4.0
15 to 19 years	66	4.1
20 to 24 years	52	3.2
25 to 29 years	50	3.1
30 to 34 years	31	1.9
35 to 39 years	39	2.4
40 to 44 years	42	2.6
45 to 49 years	56	3.5
50 to 54 years	53	3.3
55 to 59 years	36	2.2
60 to 64 years	36	2.2
65 to 69 years	32	2.0
70 to 74 years	18	1.1
75 to 79 years	15	0.9
80 to 84 years	6	0.4
85 years and over	9	0.6

Subject	Number	Percent
Median age (years)	31.1	(X)
16 years and over	529	32.9
18 years and over	498	31.0
21 years and over	462	28.8
62 years and over	99	6.2
65 years and over	80	5.0
Female population	873	54.4
Under 5 years	71	4.4
5 to 9 years	58	3.6
10 to 14 years	66	4.1
15 to 19 years	66	4.1
20 to 24 years	58	3.6
25 to 29 years	45	2.8
30 to 34 years	42	2.6
35 to 39 years	56	3.5
40 to 44 years	62	3.9
45 to 49 years	57	3.5
50 to 54 years	70	4.4
55 to 59 years	47	2.9
60 to 64 years	50	3.1
65 to 69 years	49	3.1
70 to 74 years	20	1.2
75 to 79 years	22	1.4
80 to 84 years	16	1.0
85 years and over	18	1.1
Median age (years)	37.9	(X)
16 years and over	664	41.3
18 years and over	640	39.9
21 years and over	598	37.2
62 years and over	151	9.4
65 years and over	125	7.8
RACE		
Total population	1,606	100.0
One Race	1,551	96.6
White	315	19.6
Black or African American	1,209	75.3
American Indian and Alaska Native	5	0.3
Asian	1	0.1
Asian Indian	0	0.0
Chinese	0	0.0
Filipino	1	0.1
Japanese	0	0.0
Korean	0	0.0
Vietnamese	0	0.0
Other Asian [1]	0	0.0
Native Hawaiian and Other Pacific Islander	1	0.1
Native Hawaiian	1	0.1
Guamanian or Chamorro	0	0.0
Samoan	0	0.0
Other Pacific Islander [2]	0	0.0
Some Other Race	20	1.2
Two or More Races	55	3.4
White; American Indian and Alaska Native [3]	0	0.0
White; Asian [3]	0	0.0
White; Black or African American [3]	34	2.1
White; Some Other Race [3]	2	0.1
Race alone or in combination with one or more other races: [4]		
White	358	22.3
Black or African American	1,257	78.3
American Indian and Alaska Native	15	0.9

Subject	Number	Percent
Asian	6	0.4
Native Hawaiian and Other Pacific Islander	8	0.5
Some Other Race	24	1.5
HISPANIC OR LATINO		
Total population	1,606	100.0
Hispanic or Latino (of any race)	51	3.2
Mexican	32	2.0
Puerto Rican	6	0.4
Cuban	0	0.0
Other Hispanic or Latino [5]	13	0.8
Not Hispanic or Latino	1,555	96.8
HISPANIC OR LATINO AND RACE		
Total population	1,606	100.0
Hispanic or Latino	51	3.2
White alone	12	0.7
Black or African American alone	18	1.1
American Indian and Alaska Native alone	0	0.0
Asian alone	0	0.0
Native Hawaiian and Other Pacific Islander alone	0	0.0
Some Other Race alone	13	0.8
Two or More Races	8	0.5
Not Hispanic or Latino	1,555	96.8
White alone	303	18.9
Black or African American alone	1,191	74.2
American Indian and Alaska Native alone	5	0.3
Asian alone	1	0.1
Native Hawaiian and Other Pacific Islander alone	1	0.1
Some Other Race alone	7	0.4
Two or More Races	47	2.9
RELATIONSHIP		
Total population	1,606	100.0
In households	1,606	100.0
Householder	656	40.8
Spouse [6]	151	9.4
Child	520	32.4
Own child under 18 years	361	22.5
Other relatives	184	11.5
Under 18 years	100	6.2
65 years and over	12	0.7
Nonrelatives	95	5.9
Under 18 years	7	0.4
65 years and over	5	0.3
Unmarried partner	43	2.7
In group quarters	0	0.0
Institutionalized population	0	0.0
Male	0	0.0
Female	0	0.0
Noninstitutionalized population	0	0.0
Male	0	0.0
Female	0	0.0
HOUSEHOLDS BY TYPE		
Total households	656	100.0
Family households (families) [7]	396	60.4
With own children under 18 years	177	27.0
Husband-wife family	151	23.0
With own children under 18 years	50	7.6
Male householder, no wife present	45	6.9
With own children under 18 years	26	4.0
Female householder, no husband present	200	30.5
With own children under 18 years	101	15.4

Subject	Number	Percent
Nonfamily households [7]	260	39.6
Householder living alone	227	34.6
Male	99	15.1
65 years and over	25	3.8
Female	128	19.5
65 years and over	54	8.2
Households with individuals under 18 years	234	35.7
Households with individuals 65 years and over	169	25.8
Average household size	2.45	(X)
Average family size [7]	3.16	(X)
HOUSING OCCUPANCY		
Total housing units	905	100.0
Occupied housing units	656	72.5
Vacant housing units	249	27.5
For rent	67	7.4
Rented, not occupied	2	0.2
For sale only	18	2.0
Sold, not occupied	13	1.4
For seasonal, recreational, or occasional use	1	0.1
All other vacants	148	16.4
Homeowner vacancy rate (percent) [8]	4.4	(X)
Rental vacancy rate (percent) [9]	19.3	(X)
HOUSING TENURE		
Occupied housing units	656	100.0
Owner-occupied housing units	377	57.5
Population in owner-occupied housing units	855	(X)
Average household size of owner-occupied units	2.27	(X)
Renter-occupied housing units	279	42.5
Population in renter-occupied housing units	751	(X)
Average household size of renter-occupied units	2.69	(X)

X Not applicable.

[1] Other Asian alone, or two or more Asian categories.

[2] Other Pacific Islander alone, or two or more Native Hawaiian and Other Pacific Islander categories.

[3] One of the four most commonly reported multiple-race combinations nationwide in Census 2000.

[4] In combination with one or more of the other races listed. The six numbers may add to more than the total population, and the six percentages may add to more than 100 percent because individuals may report more than one race.
[5] This category is composed of people whose origins are from the Dominican Republic, Spain, and Spanish-speaking Central or South American countries. It also includes general origin responses such as "Latino" or "Hispanic."
[6] "Spouse" represents spouse of the householder. It does not reflect all spouses in a household. Responses of "same-sex spouse" were edited during processing to "unmarried partner."
[7] "Family households" consist of a householder and one or more other people related to the householder by birth, marriage, or adoption. They do not include same-sex married couples even if the marriage was performed in a state issuing marriage certificates for same-sex couples. Same-sex couple households are included in the family households category if there is at least one additional person related to the householder by birth or adoption. Same-sex couple households with no relatives of the householder present are tabulated in nonfamily households. "Nonfamily households" consist of people living alone and households which do not have any members related to the householder.

[8] The homeowner vacancy rate is the proportion of the homeowner inventory that is vacant "for sale." It is computed by dividing the total number of vacant units "for sale only" by the sum of owner-occupied units, vacant units that are "for sale only," and vacant units that have been sold but not yet occupied; and then multiplying by 100.
[9] The rental vacancy rate is the proportion of the rental inventory that is vacant "for rent." It is computed by dividing the total number of vacant units "for rent" by the sum of the renter-occupied units, vacant units that are "for rent," and vacant units that have been rented but not yet occupied; and then multiplying by 100.
Source: U.S. Census Bureau, 2010 Census.

U.S. Census Bureau

AMERICAN FactFinder

DP-1 | Profile of General Population and Housing Characteristics: 2010

2010 Demographic Profile Data

NOTE: For more information on confidentiality protection, nonsampling error, and definitions, see http://www.census.gov/prod/cen2010/doc/dpsf.pdf.

Geography: Census Tract 4, Delaware County, Indiana

Subject	Number	Percent
SEX AND AGE		
Total population	1,967	100.0
Under 5 years	187	9.5
5 to 9 years	143	7.3
10 to 14 years	132	6.7
15 to 19 years	160	8.1
20 to 24 years	151	7.7
25 to 29 years	160	8.1
30 to 34 years	142	7.2
35 to 39 years	106	5.4
40 to 44 years	140	7.1
45 to 49 years	168	8.5
50 to 54 years	147	7.5
55 to 59 years	92	4.7
60 to 64 years	79	4.0
65 to 69 years	54	2.7
70 to 74 years	44	2.2
75 to 79 years	21	1.1
80 to 84 years	23	1.2
85 years and over	18	0.9
Median age (years)	31.1	(X)
16 years and over	1,474	74.9
18 years and over	1,422	72.3
21 years and over	1,310	66.6
62 years and over	204	10.4
65 years and over	160	8.1
Male population	997	50.7
Under 5 years	97	4.9
5 to 9 years	78	4.0
10 to 14 years	73	3.7
15 to 19 years	86	4.4
20 to 24 years	58	2.9
25 to 29 years	72	3.7
30 to 34 years	76	3.9
35 to 39 years	52	2.6
40 to 44 years	70	3.6
45 to 49 years	99	5.0
50 to 54 years	87	4.4
55 to 59 years	47	2.4
60 to 64 years	33	1.7
65 to 69 years	24	1.2
70 to 74 years	23	1.2
75 to 79 years	7	0.4
80 to 84 years	7	0.4
85 years and over	8	0.4

Subject	Number	Percent
Median age (years)	31.5	(X)
16 years and over	735	37.4
18 years and over	706	35.9
21 years and over	647	32.9
62 years and over	90	4.6
65 years and over	69	3.5
Female population	970	49.3
Under 5 years	90	4.6
5 to 9 years	65	3.3
10 to 14 years	59	3.0
15 to 19 years	74	3.8
20 to 24 years	93	4.7
25 to 29 years	88	4.5
30 to 34 years	66	3.4
35 to 39 years	54	2.7
40 to 44 years	70	3.6
45 to 49 years	69	3.5
50 to 54 years	60	3.1
55 to 59 years	45	2.3
60 to 64 years	46	2.3
65 to 69 years	30	1.5
70 to 74 years	21	1.1
75 to 79 years	14	0.7
80 to 84 years	16	0.8
85 years and over	10	0.5
Median age (years)	30.8	(X)
16 years and over	739	37.6
18 years and over	716	36.4
21 years and over	663	33.7
62 years and over	114	5.8
65 years and over	91	4.6
RACE		
Total population	1,967	100.0
One Race	1,886	95.9
White	1,491	75.8
Black or African American	355	18.0
American Indian and Alaska Native	7	0.4
Asian	6	0.3
Asian Indian	4	0.2
Chinese	2	0.1
Filipino	0	0.0
Japanese	0	0.0
Korean	0	0.0
Vietnamese	0	0.0
Other Asian [1]	0	0.0
Native Hawaiian and Other Pacific Islander	3	0.2
Native Hawaiian	1	0.1
Guamanian or Chamorro	0	0.0
Samoan	2	0.1
Other Pacific Islander [2]	0	0.0
Some Other Race	24	1.2
Two or More Races	81	4.1
White; American Indian and Alaska Native [3]	12	0.6
White; Asian [3]	4	0.2
White; Black or African American [3]	49	2.5
White; Some Other Race [3]	2	0.1
Race alone or in combination with one or more other races: [4]		
White	1,564	79.5
Black or African American	410	20.8
American Indian and Alaska Native	21	1.1

Subject	Number	Percent
Asian	16	0.8
Native Hawaiian and Other Pacific Islander	6	0.3
Some Other Race	35	1.8
HISPANIC OR LATINO		
Total population	1,967	100.0
Hispanic or Latino (of any race)	44	2.2
Mexican	30	1.5
Puerto Rican	4	0.2
Cuban	3	0.2
Other Hispanic or Latino [5]	7	0.4
Not Hispanic or Latino	1,923	97.8
HISPANIC OR LATINO AND RACE		
Total population	1,967	100.0
Hispanic or Latino	44	2.2
White alone	20	1.0
Black or African American alone	3	0.2
American Indian and Alaska Native alone	0	0.0
Asian alone	0	0.0
Native Hawaiian and Other Pacific Islander alone	0	0.0
Some Other Race alone	16	0.8
Two or More Races	5	0.3
Not Hispanic or Latino	1,923	97.8
White alone	1,471	74.8
Black or African American alone	352	17.9
American Indian and Alaska Native alone	7	0.4
Asian alone	6	0.3
Native Hawaiian and Other Pacific Islander alone	3	0.2
Some Other Race alone	8	0.4
Two or More Races	76	3.9
RELATIONSHIP		
Total population	1,967	100.0
In households	1,859	94.5
Householder	738	37.5
Spouse [6]	195	9.9
Child	599	30.5
Own child under 18 years	446	22.7
Other relatives	150	7.6
Under 18 years	76	3.9
65 years and over	8	0.4
Nonrelatives	177	9.0
Under 18 years	12	0.6
65 years and over	5	0.3
Unmarried partner	101	5.1
In group quarters	108	5.5
Institutionalized population	0	0.0
Male	0	0.0
Female	0	0.0
Noninstitutionalized population	108	5.5
Male	85	4.3
Female	23	1.2
HOUSEHOLDS BY TYPE		
Total households	738	100.0
Family households (families) [7]	442	59.9
With own children under 18 years	230	31.2
Husband-wife family	195	26.4
With own children under 18 years	86	11.7
Male householder, no wife present	59	8.0
With own children under 18 years	35	4.7
Female householder, no husband present	188	25.5
With own children under 18 years	109	14.8

Subject	Number	Percent
Nonfamily households [7]	296	40.1
Householder living alone	223	30.2
Male	121	16.4
65 years and over	19	2.6
Female	102	13.8
65 years and over	32	4.3
Households with individuals under 18 years	272	36.9
Households with individuals 65 years and over	132	17.9
Average household size	2.52	(X)
Average family size [7]	3.14	(X)
HOUSING OCCUPANCY		
Total housing units	1,009	100.0
Occupied housing units	738	73.1
Vacant housing units	271	26.9
For rent	71	7.0
Rented, not occupied	0	0.0
For sale only	33	3.3
Sold, not occupied	15	1.5
For seasonal, recreational, or occasional use	0	0.0
All other vacants	152	15.1
Homeowner vacancy rate (percent) [8]	9.8	(X)
Rental vacancy rate (percent) [9]	13.7	(X)
HOUSING TENURE		
Occupied housing units	738	100.0
Owner-occupied housing units	289	39.2
Population in owner-occupied housing units	740	(X)
Average household size of owner-occupied units	2.56	(X)
Renter-occupied housing units	449	60.8
Population in renter-occupied housing units	1,119	(X)
Average household size of renter-occupied units	2.49	(X)

X Not applicable.

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[2] Other Pacific Islander alone, or two or more Native Hawaiian and Other Pacific Islander categories.

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[9] The rental vacancy rate is the proportion of the rental inventory that is vacant "for rent." It is computed by dividing the total number of vacant units "for rent" by the sum of the renter-occupied units, vacant units that are "for rent," and vacant units that have been rented but not yet occupied; and then multiplying by 100.

Source: U.S. Census Bureau, 2010 Census.